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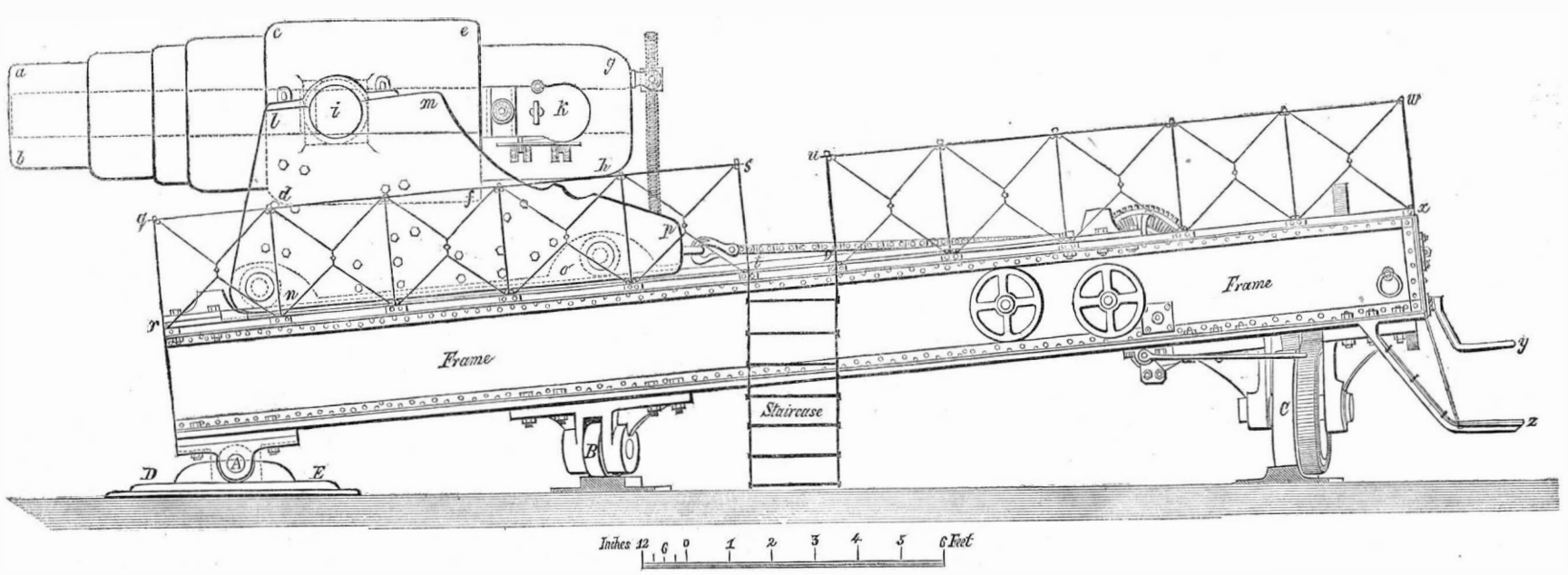
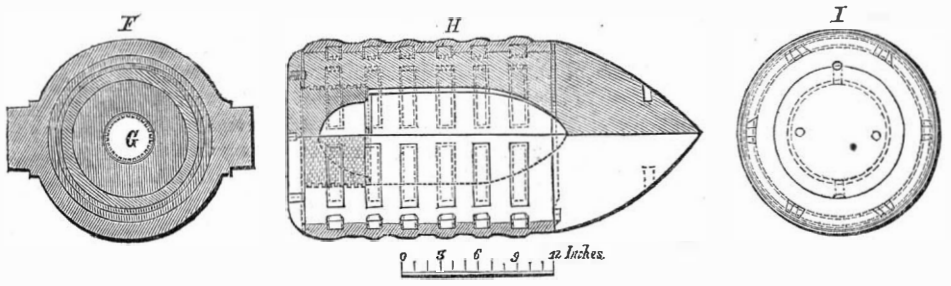
Krupp's New Cannon for the Paris Exhibition.

Rhineland and Westphalia are undoubtedly among the most important provinces of Prussia, and one of their most important establishments is that of Mr. Krupp, which from the character of its work must be ranked among the first manufactories on the European continent.

This establishment will be represented at the Paris Exhibition by four or five steel cannon, ranging in size from the smallest field piece to the heaviest caliber, the one represented in the accompanying engraving being without rival the most powerful cannon in existence. This immense gun





KRUPP'S BIG GUN FOR THE PARIS EXHIBITION.

is a rifled breech-loader of 14 inches bore, constructed wholly of cast steel, and weighs 1,000 cwt., and the cannon (intended for the armament of a coast fortification) consists of an inner barrel having several cast-steel rings or reinforces welded around it while hot.

The inner barrel, the most important part of the whole, weighs 400 cwt. and is wrought from a pig of 850 cwt., under a hammer of 1,000 cwt. The loss of its original weight is caused by the falling off of the head or mold end, by forging, turning and boring. The cast-steel rings weigh all together 600 cwt. The breech stopper is Krupp's own invention. A charge of gunpowder of one hundred pounds is required to project the shot, which weighs eleven hundred pounds. As our readers may imagine, the cost of such an enormous piece is somewhat high, and the gun is now valued at $100,000. Workmen have been engaged in its construction night and day for the past year, and only by the greatest exertion will it be completed in time for the exposition.

The cannon is mounted on a steel carriage forty feet long by nine feet wide, and weighing 500 cwt. The mechanism for maneuvering this enormous mass of metal is so arranged that the proper elevation, declination, etc., can be given by one or two men with the greatest facility, and with such rapidity that a passing vessel can be aimed at with accuracy.

As on the railroads no car could be found strong enough for transporting this cannon, Krupp was obliged to build an iron car for this especial purpose, which rests upon eight wheels, and which will take the monster to Paris and from thence to its final destination. The lightest cannon to be exhibited in Paris will be still heavier than the first cast steel one with which in 1849 Krupp first brought his invention of cast steel arms before the public. In order to test the various improvements constantly being introduced respecting the material as well as the construction of these guns, trials are continually made in Krupp's establishment which are witnessed by army officers of all nationalities, sent especially by their respective governments to Essen. About 30 or 40 cwt. of gunpowder are used every month for these trials.

REFERENCES TO THE ENGRAVING.—A B C, rollers; D E, pivot plate; F, cross section of barrel through trunnion, *i*; G, bore; H, longitudinal section of cast steel shot with leaden coating; I, cross section of same; *a b g h*, barrel; *c d e f*, reinforce; *i*, trunnion; *k*, breech stopper; *l m n o p*, carriage; *q r s t u v w x*, railing; *y*, crank communicating with mechanism by which the gunner moves the cannon, carriage, and frame, his position being upon the step, *z*.—*Leipzig Allgem. Illustr. Zeitung.*

A NOVEL COMBINATION.—An interesting suggestion is made in the St Louis *Republican* by Wm. H. Githens, for improving the Des Moines rapids (Mississippi river) and obtaining at the same time a railroad tunnel, a dam, and large waterpower, by one and the same structure. That is: to build a dam at the foot of the rapids, in the form of an arch, the hollow of which would form a tunnel, the hight of which would be sufficient to set back the rapids to the upper level and make smooth navigation, and the top of which would be crossed by a lock or locks for raising and lowering vessels. The water power obtained would be sufficient to found a manufacturing city.

IMPROVED ADJUSTABLE MITERING APPARATUS.

The accompanying engravings represent a mitering machine for which letters patent were granted through the Scientific American Patent Agency Aug 21, 1866. It is a semi-

Fig. 1.

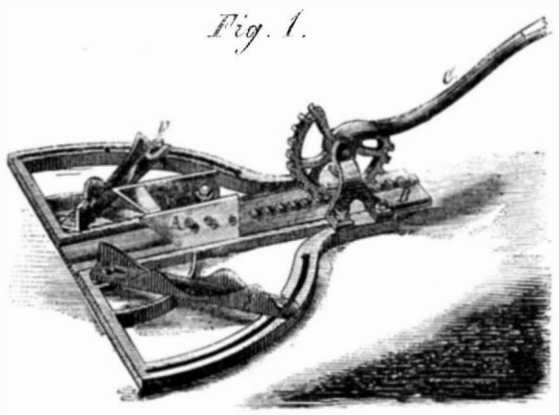
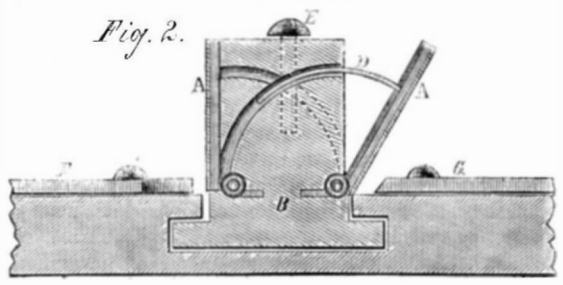


Fig. 2.



circular bed of iron, eighteen by twenty-eight inches, upon which are mounted hinged and sliding knives and movable guides, with a lever, segment, and rack. Fig. 1 is a perspective view and Fig. 2 a front, longitudinal, vertical section. A are knives are adjusted in the position seen at F, A, in both figures, and by adjusting the rest the end or edge can be cut to any angle desired. For mitering flatwise the position of knives and rests is as at G, A, Fig. 2, the rest being secured at an angle of 90° with the cutter head and the knife, A, being brought and secured in the desired position.

The machine will miter a molding six inches wide, the great power of the lever being directly applied. The form of the knife edge makes a drawing cut insuring perfectly smooth work. The machine appears to be well adapted to the purposes of the picture frame maker and cabinet worker and will prove useful in the joiner's shop. For further particulars address Howard, Thorndike, & Co. Belfast, Me.

THE PARIS EXPOSITION.

Our engraving (page 316) gives a view of the French Industrial Palace, situated in the Champ (field) de Mars, at Paris. This is a locality about one and a half miles from the central portion of the city, and, before the enterprise, was a large, flat, sandy, and naked plain, with its surface lower than the surrounding neighborhood, but which has now been transformed to a spacious and pleasant park. Its surface has been raised, hillocks and little valleys created, streams and rivulets, leading to little waterfalls and lakes, introduced in every direction, and the grounds diversified with buildings which are made the complete copies, in inward and outward fittings, of the structures of almost all the nations of the globe. In the grounds, also, are groups of sculpture, ornamental fountains, lawns, groves of trees, parterres of flowers and shrubbery, a garden with almost every known plant and shrub, horticultural establishments, marine and fresh-water aquaria, model cottages for the working people, infant nurseries, and almost every conceivable structure of interest.

The exhibition building is elliptical in form, and consists of a series of eight concentric halls, of oval shape upon the ground, each one outside of the other, which surround a neatly arranged garden in the centre. From this garden numerous covered streets or passages, each one bearing the name of a different nation, penetrate outward, and cross the halls in manner resembling the spokes of a wagon wheel, which radiate from the hub in every direction. Another separate building in the park, contains the surplus goods of various nations. The two structures cover about 185,000

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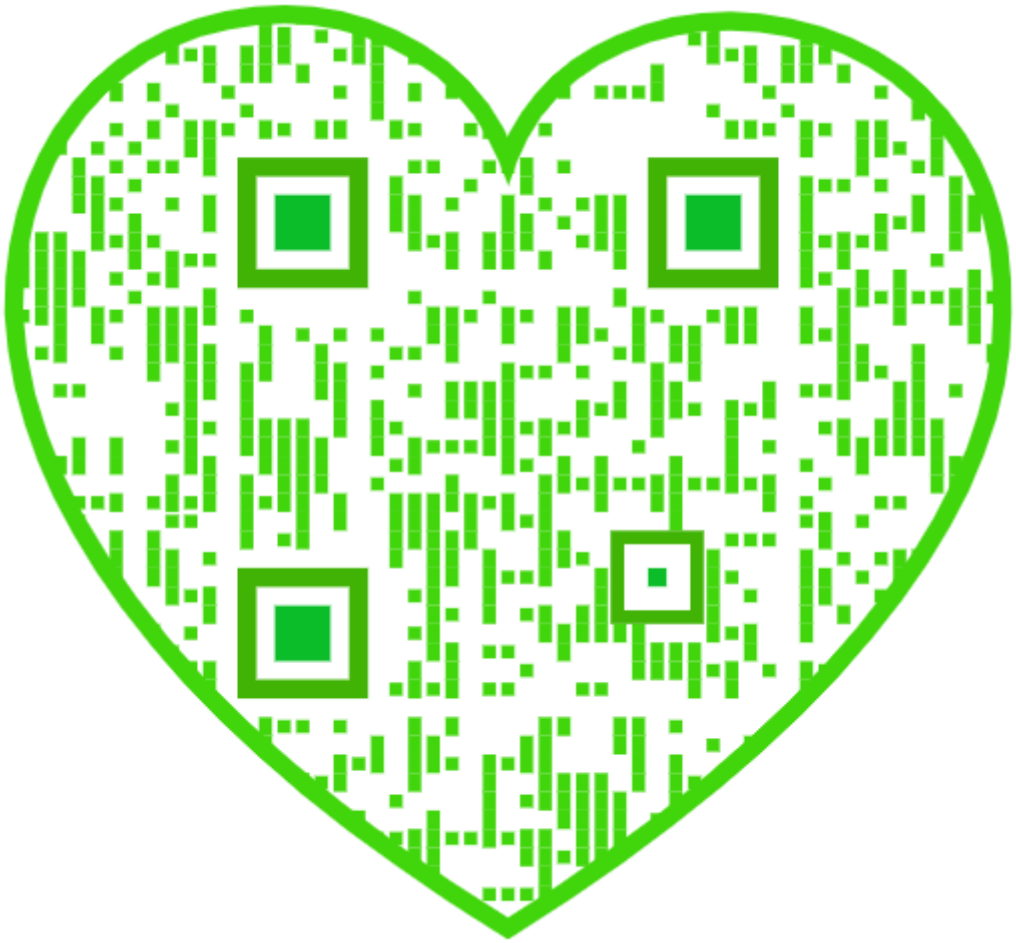

square yards of space, and 500,000 is about the area of the whole locality. The buildings contain 800,000 articles, presented by 46,000 individuals, a list of the articles alone requiring a book of 1,300 double-column pages, while the care of the exhibition, and showing of the goods, keep within the buildings a constant population of 15,000, exclusive of outside visitors. It is stated that the government has expended two and a quarter millions of dollars upon the buildings and grounds, and it is probable that private expenditures will raise the cost to beyond three millions. The receipts from licensed stalls and exhibitors' spaces are a million of dollars.

THE GENERAL EXHIBITION, ENGINE DEPARTMENT, ETC.

These are referred to in the following letter from our Paris correspondent :—

PARIS, April 9th, 1867.

Though the progress of the Exhibition toward completion the past week has not been quite as noticeable as during the week previous to the opening, yet a great deal has been done, and it is beginning now to be thronged with visitors. The price of admission, which was five francs during last week, has now been reduced to one franc, which is certainly low enough to allow all who desire to visit it, either for amusement or instruction, to do so as often as they wish.

STEAM ENGINES—AMERICAN PATTERNS.

The machinery is in operation every day, but this for only from two to five o'clock. No doubt it is well to require short runs at first, so that each exhibitor may have ample time to remedy any little defects of which may appear in his machine. I notice that this is quite necessary for almost all. Of course few of the engines have ever run before coming here, and most of them are just fairly installed in position, so that it is not to be wondered at that many details require attention at first. Some of the French engines are quite large, and look very well as far as polish and mere external appearance go, but in many the construction is any thing but good. The English department undoubtedly carries the palm for excellence, both in workmanship and design, of its steam engines, but it is proper that I should mention, what I observe the English papers do not notice, that the only two engines in that or in any other department which can lay claim to any scientific excellence, are American in design. These are the Corliss engine, built by Messrs. Hick Hargreaves & Co., of Boston, with Spencer's improved tripping arrangement, and the Allen engine, introduced here by Mr. Charles T. Porter, of New York, and built by the Whitworth Company. In regard to the former, the opinion of many is that Mr. Corliss' own engine is going to beat it, notwithstanding the "improvements." But we must not be in a hurry to judge, but wait until the actual result becomes known, which will be in a few weeks, when Mr. Corliss' engine gets to work. The latter is, to say the least, a beautifully finished job.

THE ALLEN ENGINE AS EXHIBITED.

In regard to the other engine mentioned, it will and indeed does already attract more attention than any other engine in the Exhibition. This is partly due to the remarkable speed at which it runs, viz: 200 revolutions per minute with a two feet stroke. This engine is so important that I shall soon send you a full description of its construction. A very interesting feature of Mr. Porter's exhibition is a dissected model of his engine, to show the action of the valve gear. It consists of a perfect engine, being indeed one of a lot built for a certain purpose, in which the upper half of the cylinder is planed off so as to uncover the piston, and the steam chest, which is at the side of the cylinder, is cut in two longitudinally so as to show the exact motion of the valves. This is driven by suitable gearing from the large engine at the speed of 12 revolutions per minute, but the connection is such that it can be thrown out of gear and worked at pleasure by hand, so as to give time to observe more distinctly the amount of opening of the valves at the ends of the stroke and the points at which they close. The valve gear belongs to that class in which the cut-off is regulated by the governor, and to show the operation of this in the model he has the governor driven at the same speed as that on the main engine, so that while the piston and valves move slowly, the governor is making the same variations in the distribution that are occurring in the large engine: thus enabling one to see what is going on inside the steam chest of the latter.

PROPOSED TEST OF STEAM ENGINES.

Informal notice has been given to exhibitors that all engines will probably be required to be indicated. and the award be based on. the facts so elicited. Though this has not been finally decided on as yet, it is a most rational requirement. In these days of engineering we want something more than highly polished connecting rods, or even than good workmanship *alone*. In the London Exhibition of 1862 there were many engines considered worthy to be exhibited, which when the indicator was applied to them showed a distribution of steam most defective, and it is obviously wrong that such an engine, however finely finished, should be allowed to complete with perhaps a plainer one in which the steam is freely admitted and freely released from the cylinder.

Considered as a mechanical job, there is a beautiful pair of engines exhibited by Messrs. Galloway & Sons of Manchester. The framing of these engines is as neat and substantial an arrangement as it would seem possible to design. There are two cylinders side by side, the steam chests being on the sides and between the cylinders, so that they are bolted together by these parts as in English inside cylinder locomotives; not in itself, I am sure, an arrangement to be commended. The framing consists of three straight and parallel ribs, if we may call them so, one running from the outside of each cylinder to the crank shaft pillow block, and one in the center between the two cylinders, containing in itself the center pillow block for the shaft. These ribs, which are perhaps 6 inches wide and hollow, are of such a hight as to come a little above the center line of the engine from the cylinders to the pillow block, and beyond this point they are made lower, thus enabling inclined caps to be used for the pillow blocks, which are formed in the body of the frame and therefore in the best possible position for sustaining the strains that come upon them. The framing extends far enough beyond the bearings of the shaft to allow the three main ribs to be connected by a cross member just clear of the throw of the cranks. As this appears to be all cast in one, there being no flanges or bolts to break the continuity of the lines, it presents the most agreeable appearance to the eye. A bonnet at the *end* of the steam chest between the back cylinder heads gives access to the valves, but under the difficulties which must always exist where the valve seats are so close together.

THE LENOIR GAS ENGINE.

There are several Lenoir gas engines in the French department, and one or two of them are connected with the gas pipes, so that they will probably be in operation. I shall take pains to observe the performance of these engines and communicate the results, as I know considerable interest is felt in America in this motor. In mechanical construction, no changes of any importance appear to have been made in the last few years, and those built in New York have undoubtedly several improvements in this respect.

THE MARINE ENGINES.

These are not yet in operation, but it is expected that in ten days or two weeks they will be so. The display of these will not equal that in London in 1862, as the English are only inadequately represented. Some of those exhibited will be in motion under steam from their boilers, and Penn's engine will be driven by gearing. In the grounds are two lighthouses. The French is a very tasteful structure of iron and is erected on an artificial rock jutting out into one of the small lakes, and is really quite an ornament to the park. The English looks like a scaffolding erected for some temporary purpose, and it must be by a considerable exercise of patience that its presence is tolerated in such a place. It is to be provided with an electric light from an electro-magnetic machine driven by two Allen engines of the same size as Mr. Porter's model.

The American department is filling up rapidly. There are a number of cases of breech-loading rifles, including the Peabody, Remington, Spencer and others, which will represent our undoubted superiority in this branch of invention. The display of sewing machines is not yet very imposing, though I observe a number are being unpacked. The best exhibition of these, however, is that to be seen in every city in Europe in the warehouse windows of the Grover & Baker, Wheeler & Wilson, Singer, Wilcox & Gibbs, and other American companies · so that our claim to supremacy in this manufacture will not depend on what appears in Paris this year, though I have no doubt we shall show what progress has been made since 1862. SLADE.

From late Paris correspondence of the New York *Tribune* we add further details of interest.

GENERAL FEATURES OF THE EXHIBITION.

The French part occupies nearly half the building. Of the remaining space England takes one fourth, then Belgium, followed by Prussia, Austria, and Switzerland, in the order named, and then come the United States, ranking seventh as to space, and taking up one sixteenth of the room devoted to foreign nations. The United States have a retired but pleasant position—have progressed greatly in arranging the goods, but were at first more backward than any other nation.

Entering at the Grand Avenue of the Park, the same gate that admits the visitor registers the number, and straight down the Grand Avenue, among innumerable fountains, statues, and curious edifices, under a green and golden vellum canopy you find the great arched portal of the Exhibition building broad and high before you, and its exterior circle, seventy feet high, iron and glass, sweeps away into distance, crowded with whirling, humming machineries. To the right you see the English looms and engines, to the left the panorama of the French, her gallery stairway supported by enormous pyramids of copper, zinc, iron, and steel, and at their crests two revolving lights, like giant diamonds, go wheeling crystal all the while. Along the gallery, at intervals, great engines stand, in the solid floor below, to turn the shafts that put all the machines in motion. These engines represent each city in France, and the machines they turn represent all the practical arts which France essays. A steady line of workmen, male and female, reach among the brasses and wheels, and these are dressed in the blue *blouses* and paper caps that the French *ouvrier* keeps so neat and so well.

Railway bars, copper fabrics, wrought iron cordage, and long lines of spinners, moving the spools that ride upon their railways, with a thousand teeth apiece, and every tooth a prestidigitateur, eating yarn to give back cloth and silk, are here alternated with frequent models of the public works of France. An interval of mammoth railway carriages, headed by the Paris locomotives, succeeds to models of the French marine, then indifferent coal specimens of France are passed, and the carriages of the people come into view; not light are they like ours, but full of ponderous laces, and bearing coats of arms. Here are French sewing-machines; poor little telegraph instruments compared to ours, and with an organ booming the French department comes to an end, a wonderful museum of a great nation's industry. Next stand the colonies of France, in Africa, Asia, and America, with canes of sugar and bamboo at their crushing instruments, great bales of cork, and feeble traces of cotton.

The next great nation is Belgium, whose mechanical industry is the most ardent of any Continental nation. She is the New-England of the Continent, and her engines are more massive and powerful, but less graceful, than the French. Belgium shows in her department of mechanics great power and resources, but little that is novel.

The next of the nations is Prussia, that has brought hither all sorts of guns, and swivels, and bayonets. She shows products from all her newly-conquered provinces, locomotives and saddlery, wood-carving and threshing machines, much, indeed, that is quaint. but little that is suggestive, except ordnance. Prussian, and indeed all German machinery, is slow and plain, not comparable to that of France or Belgium.

Baden, in fire engines, field and street telegraphy, and ordnance, stands well. Russia and Turkey lie together, with few machines or products, but very completely and lavishly ornamented in strange, half Byzantine architectures. Sweden, and Norway, and Italy have little machinery. Great Britain in the mechanical department appears to great advantage; yet the models of almost all her vehicles, looms, boilers, and engines are like her people, thick-set and stumpy.

The crowning glory of its great Exhibition is its art collection. One half is the work of living Frenchmen. Their school of painting is so far the superior of all others, that not even rival patriotism questions it. The Germans give up the contest by refusing to exhibit. The English oil paintings are numerous but do not excel; her water color specimens are unequalled. Spain, among a lot of bad pictures, has one of the landing of the Pilgrims at Plymouth. Artists from almost all nations are represented, furnishing altogether 6000 paintings and designs, and 400 statues. The United States are represented by less than a hundred productions, remarkable among which appears a picture of the parable of the Prodigal Son, executed in Paris upon order of A. T. Stewart, of New York, for $12,000.

AFRICAN STRUCTURES AND CONTRIBUTIONS.

Unique and most magnificent are the contributions of African civilization. Together, they compose by far the most gorgeous part of the Universal Exposition, and the Viceroy of Egypt, probably the richest individual in the world, has expended 8,000,000 francs in decorating his section and his park Twenty-six models of new or decaying Egyptian temples are exhibited, and in the Park without stands the Viceroy's Palace, impressive in architecture, and gorgeous and perfect in its inward fittings. Behind the Palace stand the stables, with camel occupants, and oriental slaves swarthy and dumb. Next is seen a modern Egyptian house and *café*, such as is seen at Cairo, built high and one sided, open to the breeze but sheltered from the sun. The great temple of Edfon comes next, and then a circular building and vestibule, to exhibit the great Suez Canal speculation. Herein is a section of the canal, and a model of its locks. The Suez Canal is a French and Egyptian oil-speculation. In result it is nothing as yet, but money has been poured lavishly into it, while the shifting sand they excavate rolls back into the channel daily, and dismays them. The Viceroy is a gainer, either by the prosecution or the completion of the work; the railway across the Isthmus is his private property.

Tripoli, Morocco and Tunis are all represented, the latter by the Palace of her Bey, which is the finest edifice of all that surround the exposition, and is peopled with troups of Arab attendants in native costume. These Moors exhibit more vitality to-day than the Spain which expelled them, and the Egypt of 1867 stands out more vital than Rome, the head of the Church.

FURTHER EUROPEAN EXHIBITORS.

The Pope and Cardinals exhibit copies of architecture 500 years old, some fruits, oils, wines, private jewelry, carriages, and imitation carpets, but no educational machineries and few tools of surgery or economy. Spain characteristically shows 38 exhibitors of church tapers, and out of 29 paper manufacturers two thirds make only cigarette paper. Italy shows much vitality, eight Italians exhibiting improved telegraph cables, and tramways, hospital trains, iron sleepers, novel railway apparatus, and military goods being presented in great variety. There are also 90 varieties of Italian marble, most of them strikingly beautiful. Greece shows steam engines and navigating balloons, with her native products, but not one agricultural, or mining, or domestic invention. Russia has been the most forward nation of all to supply and ornament her department, which shows the towers of the Kremlin, booths from the fair at Novogorod, huts of the Cossacks, the palatial arches of St. Petersburg, and rich displays of fabrics. The palace of the Grand Seignor displays the architecture of Turkey, whose department is brim-full of cunning, dextrous, and beautiful workmanships, the richest that are made, and gorgeous with silver and gold. But in machineries the Turks, like other Asiatic nations, have nothing, save one fire engine. Their cunning is only in handicraft; they entertain no notion that nature should do man's work, and steam and the magnet are to them almost undiscovered. China comes forward with her silks, matting, teas, firecrackers, and outside, with a two-story tea drinking saloon, open-air theater, and native women to supply tea and take the change. Japan has an embassy, shaved and sworded, looking about. Switzerland excels in watches, and her breeds of St. Bernard dogs attract attention. The Hollanders have in the Park a model butter and dairy farm. Norway excels in fishing apparatus; Austria in cereals; Portugal in heavy wines.

In the Park, the Emperor's present to the Exhibition is an iron lighthouse, 180 feet high, standing upon a very natural rock in an artificial lake.

THE UNITED STATES DISPLAY.

The United States Department is found upon examination to fall below the expectations of foreigners and friends. The

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American Commissioner in Paris is a patriotic gentleman, without executive ability, and with little knowledge of the idiosyncrasies of his countrymen. Our goods are scattered, one half of them standing in a shed or *annexe* out of the way, while the total of them could be made to fill the sector of the main building appropriated to us. This main sector is ornamented with the shields and seals of the States. A French engine of the size we see grinding chocolate, runs our machinery; but we are now putting up a fair Corliss engine, one out of five that we show. In the American *annexe*, where you can see the French committee of awards at work every day, looking learnedly, the most characteristic of our inventions stand. Conspicuous in the midst is the beautiful Grant locomotive, *America*, the largest and finest ever seen in Europe, built at Paterson, N. J., standing high and colossal, its engine house made of the oiled woods of our country—ash, maple, walnut and oak—splendid in its brazen moldings and appointments, and its tender is painted with the arms of the Republic. This engine cost $35,000 and great interest is manifested to see it fired up and run. It is the most majestic single contribution that we have. Beside it, is a remarkable street railway car, built in New York for Calcutta, upon a new principle of carrying passengers, and bearing on its sides inscriptions in the native Hindostanee. With these is the great Daboll fog-trumpet, blown by steam, and stated by scientific men to be audible from horizon to horizon in the densest vapors. It was sounded the other day, and when the Arabs, Japanese, and Malays heard it, they fell upon their faces thinking Allah had come in the shape of a roaring lion. It roused the Faubourgs like the bell of Marat. Curled up in its huge case, as if for a snore, its Ericsson engine, like a dapper stomach, just throbbing; the whistle of the calliope is no more than a bird song to it.

The American reapers and mowers, although the most ornate and extraordinary in the Fair, are largely represented from almost every manufactory. The specimens on show are often in carved and inlaid woods, and in engraved steel. Ohio, New York and Massachusetts have each their favorite mowers, but that which most attracted and surprised has been the patent of John G. Perry, who sits upon it like a jovial Archimedes, that has put his fulcrum in Rhode Island and means to mow the universe. This machine has a curious hollow axle, that gives it the air of standing up of itself, and the simple principles on which it is built, with the few parts into which it is separated, are reasons why the Paris people do not wonder when they hear that thousands of similar cradling giants will go through the fields of America next harvest. Wood, Ridgeway, McCormick, Wallace and Seymour are the other great reapers. New England, indeed, with her restless suggestiveness, makes almost all that is shrewd, quaint or startling here. New York is represented by massive workmanships. Her power is in her forges rather than in her idiosyncrasies. Instance the State of Connecticut again, where you see Gov. Benjamin Douglas, having quitted his executive dais to show mankind his famous pumps. He has here about 40 different garden and fire engines, rams and chargers, which are, in many cases, no bigger than a wine-bottle; yet, as you see the French water-sprinkler, with a poor hand-nozzle go to and fro wetting the flowers, you know that any one of these American pumps is a very geyser, capable of drowning a man with a jet as well as making the summer rain fall gently and equally. We are making such machineries as much for foreign as for our own people now.

The collection of platform scales, represented by Howe and Fairbanks, is curious and exhaustive. The latter great firm has one large scale adjusted to the weights of each country, so that even Turkish characters may be seen upon them; and one of their railway scales is so powerful that you could almost weigh the Exhibition building upon it, and it is at the same time so true that one apple lifted out would affect the balance-rod. The Polyglot Justice is not more blind and strong.

In the heart of the American triangle the pianos are arranged; one of the largest and best collections that the country has ever exported or exhibited. Artists of eminence make perpetual music here, and the quarter is always densely crowded. The superiority of our instruments is not questioned even by the rival manufacturers of Paris, Vienna, and Leipzig. Playel, Erard and Herz have far inferior displays, and find it difficult to attract the Littholfs, Jaels, and Liszts of the continent to their plainer wares and feebler instruments. All our great firms are represented, and the contending keys, in passages which all the world warbles, mingle their winds, as if the birds of the West in choirs, had assembled here to sing. The spectators divide their enjoyment, now listening to some composer try his own latest music upon a Schomacker, a Chickering, or a Knabe; but the seven superb instruments of the Steinways allure the professional people, and here the best musical talent in Europe may be seen from morning till dark—Stephen Keller, Eugene Ketterer, W. Kruger, Alfred Jaell—grouped about the bird-cages. The "overstrung" harp, as it is called, in the Steinway piano has attracted the greatest interest here from its novelty and the sweetness and power which its superior vibration gives The best piano makers in Europe have sought the privilege of sending their workmen to examine it: and professional artists compete to play upon it. It is very odd to note how, by our mechanical genius, we have so carried away the honors in the arts, and our department has the best music in the whole Exhibition. The grand Steinway was said by Rossini to resemble a nightingale cooing in a thunder storm. We also exhibit stringed and wind instruments and accordeons. The Lehigh Navigation Company sends a single lump of coal weighing the tuns. Colorado sends likewise a lump of crude silver as big as a cooking range. Among the novel American articles are papers made of wood, straw, and hemp; pens, combining the inkstand; apparatus to cure stammering; do. to cauterize dental machineries of all sorts, including a saliva pump; barometers of all sorts, sun dials, lenses, and compasses. The surgical department of the United States Army shows its ordinary ambulances and surgical instruments, while the Hydrographic Office is rich in new marine instrumentalities. All our States show geographical maps; cradle, rocking, and folding chairs are frequent, with iron safes and water coolers, while most of the American marbles are exposed, and many glass wares. We show paper hangings from three cities, Newark cutlery, and clocks from Connecticut, Indiana, and Louisiana. Tiffany, the jeweler, shows silverware of massive and beautiful character, and Tucker, of New York, exhibits bronze iron ware, fine as the veriest bronze. Petroleum develops 17 exhibitors; we compete in meerschaum pipes with Europe; and our cloth manufacturers come from New York, Lowell, Newark, California. and Boston. We show crinoline, now antique in Europe, water-proof stuff, wooden boot heels and soles, corsets, hats, even cameos. The Quartermaster's Department of the Army has sent over teams, equipments, and clothing, as yet badly arranged. We have tiles cut by machinery, prepared peat, crocodile boots, root cutters, prairie plows, digging machines, sorgho strippers, winnowers, sack fillers, beehives, pig cutters, sheep shearers, horse forks, guano and charrue, snares, apple peelers, alarum coffee pots, clod breakers, shoe peggers, buttonhole stitchers, and sewers without number.

The American Lead Pencil Company has one of the most prominent places in the Department, and the designs drawn in its leads are by some of our pleasantest artists. There are books from the Riverside press, and from Appletons, and photographs from almost every American City. Forty exhibitors show bandages and artificial legs; 24 guns, pistols and projectiles; every Northern State and Alabama show minerals and precious ores; the latter State is ably represented by its Chief Engineer, Hiram Haines, and his collection is very hopeful in cotton, gold, iron and coal.

The furs that we exhibit are attractive, and 11 parishes in Louisiana send tobacco; nearly all our manufacturing chemists report themselves, and in machinery of all kinds the country is well exhibited. Still, an American, with a knowledge of our mechanical superiority, and used to the grand scale on which we subdue nature, will feel demeaned by what he sees in Paris. It is suggestive, strange, and indicative of a natural genius for the industrial arts; but it is not the best of America.

The Exhibition is a success. I was at London in 1862, and looked fairly at what the English now praise so invidiously, and I believe the French Exhibition to be three times vaster, more cheerful, and more wonderful than that. France shows now in Paris more than England showed on her own soil; with equal vigor and quantity in manufactures. France far exceeds her neighbor in art, and the Grand Exposition is not surrounded by a filthy city, whose atmosphere is fog and bitumen, nor by a people whose false social system recalls to you, in every man you meet, a flunkey or a snob. All who had intended to come here will not be disappointed. The face of the world never before concentrated so many attractions.

LUBRICATING PETROLEUM AS A SICCATIVE OIL.

From a correspondent in West Virginia we have received a communication on the use of the heavy petroleums—lubricating oils—as vehicles for pigments. He believes they are equal and, in some cases, superior to linseed oil for this purpose. He quotes scientific and other authorities in support of his position. A series of experiments were made with linseed oil and Pennsylvania and West Virginia heavy petroleums in a lighted room kept at 60° F. On metal the linseed oil dried in seven days, the Pennsylvania petroleum in nine days. On glass, linseed dried in ten days, Pennsylvania in one month, and West Virginia in seven days. On wood, the experiments showed in ten coatings, each applied soon as the preceding coat was dry; linseed dry in thirty-six hours, Pennsylvania petroleum in thirty-five, and West Virginia in twenty-four.

The writer says he has seen several houses, brick and wood, which have been painted a year or more with this oil as a vehicle, and thus far the petroleum paint stands as well as that mixed with linseed. The Baltimore and Ohio Railroad Company use the petroleum for painting their cars and consume more for this purpose than for lubricating. Other statements are made to show that the lubricating petroleum is well fitted to take the place of linseed oil and that it is very much cheaper.

We are not prepared to view the substitution of this hydrocarbon for the linseed oil, so sanguinely as our correspondent. One of the facts stated by him is that the petroleum oil absorbs one sixtieth the amount of oxygen that raw linseed oil does and one fifteenth that of boiled linseed. This may be an advantage, but we do not so understand it. In drying, the linseed oil does not evaporate, but, combining with oxygen, is transformed to an elastic gum which holds the particles of paint in one mass. Petroleums hold in suspension rather than in chemical combination a certain amount of asphaltum and paraffine. When the oil is evaporated there will be left this asphaltum or paraffine, a brittle substance incapable of holding the paint powder in cohesion. It may be, however, that used with litharge, japan, and a portion of linseed oil these heavy petroleums may be adapted to some kinds of work and answer as well the purpose as pure linseed oil.

GLYCERIN PASTE for office use may be prepared by dissolving one oz. of gum arabic and two drachms of glycerin in three ounces of boiling water.

PROGRESS OF THE COMMISSION OF LIFE-SAVING INVENTIONS.

The eighteenth meeting of the Board of Commissioners was held on Saturday April 27th. Several models of life boats and rafts were examined after which the Board adjourned to a foundery in West street and witnessed some interesting and satisfactory tests of the strength of corrugated iron. A short session was held on Monday, and at its conclusion the Commission on invitation visited the steamer *Scotia* of the Cunard line, inspecting her boilers, engines, and life saving contrivances. Tuesday, was devoted to the examination of patent anchors, and witnessing some experiments with non-inflammable paint, and a trial of the portable fire-extinguisher described in these columns several weeks since. On opening the twenty-first days, proceedings, a motion was passed appointing Friday the 3d inst. as the last day on which models or drawings would be received. This step was necessarily taken as the vast collection of these devices already accumulated has been daily receiving new accessions thus indefinitely protracting the labors of the Commission. The subject of locked safety valves was taken up, and several papers from interested parties read and disposed of. The examination of inventions classed under the first division, was then declared as completed. Models of patent steering apparatus, water expelling-pumps, water detectors, and life-preserving berths were examined, and passed upon at the meeting on Thursday; afterward the Commission proceeded to the laboratory of the New York College where Prof. Doremus delivered a lecture on the employment of certain gases on board of vessels, as fire extinguishers, illustrating his views with numerous experiments.

Prof. Doremus was also present at the regular meeting on Friday, explaining at length a plan for carrying liquified carbonic acid gas in suitable reservoirs connected with stationary pipes or hose by which a fire in any part of the ship could be extinguished. Several models of life boats were submitted, also a life spar, a life preserving mattress, and anti-incrustators. The American Magnesium Company exhibited an apparatus for signaling at sea. After listening to a paper on steam boilers, their construction and causes of explosion by Mr. McDougall, the Commission adjourned.

Prof. Wheatstone's Cryptograph.

The importance of a secure cipher for commercial, military and other telegrams of a confidential nature, grows with every step in the extension of telegraphic correspondence, and has brought forth a most ingeniously simple and effective invention for the purpose mentioned, which has been adopted by the British War Office. The parties to a confidential correspondence by telegraph are each furnished with a little instrument consisting of a dial having the letters of the alpha bet printed in regular order in a circle near the circumference, with one blank space, making 27 intervals. In a circle within this runs a flanged groove having room for just 26 letters, and in which the letters, printed on separate bits of card of the exact size, are arranged in any arbitrary order understood between the parties. A secure and convenient way to fix this arbitrary order in the mind without risking it on paper, is to agree upon any word easily remembered, and when a despatch is to be sent or deciphered, write down the letters of this word, and under them write the remaining letters of the alphabet in their proper order from right to left, one letter under each letter of the word, then beginning another line under this in the same way, and so on until the entire alphabet is arranged in both lines and columns, which are to be read vertically, and the letters in the inner circle of the dial are to be arranged in that order. After the despatch is sent or deciphered, as the case may be, remove the letters, and the instrument is again uncommunicative.

But the mode of communication remains to be described. The center of the dial is penetrated, exactly like a clock, by a shaft or arbor passing through a hollow arbor, the former bearing a long and the latter a short index hand. Each of these arbors has also fixed on it a spur wheel, gearing on a loose pinion common to both, so that turning the one turns the other. But the spur wheel of the short hand has twenty-six teeth and that of the long hand twenty-seven, answering respectively to the divisions of the inner and outer circles, so that at every revolution of the long hand, the short hand completes the circuit of the alphabet and one letter further, thus gaining one every time. Consequently, a message spelled out with the long hand, and written out in the letters simultaneously indicated by the short hand, would be in a constantly changing cipher, in which no letter would be represented twice by the same substitute, and no possible clue could be obtained without first obtaining the magic word upon which the inner circle of letters was arranged. The receiver of the message, having properly arranged the arbitrary alphabet in the instrument, has only to turn the short hand to the letters of the dispatch as received, in succession, and write off those indicated by the long hand. The instrument is, of course, only to be turned forward, or from left to right.

THE CITY OF AUSTIN, Nevada, is six thousand feet above sea level, where the air is so thin that the least physical labor causes great shortness of breath, and the atmospheric pressure is so light that those of its four-thousand inhabitants who find it necessary to wear artificial teeth experience extreme difficulty in keeping their sets in position.

THE ATLANTIC CABLE, according to the London *Daily News*, is now transmitting more messages than ever. The daily number is constantly increasing, and the receipts now average $5,750 in gold a day.

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The Bursting of Guns.

We have received a communication on this subject from a gentleman who has had excellent opportunities to investigate the matter, and has made many experiments to elucidate it. During the late war a large number of the projectiles used by the respective armies were ill adapted for service. Many of them broke in the gun on the shock of discharge, others burst outside the gun prematurely, while many did not burst as intended.

Cast iron is the metal usually employed for projectiles for guns. It is highly crystalline, and the size and character of the crystals depend upon the process of extraction of the iron from the ore, and on the amount and nature of foreign materials held in chemical or mechanical combination with the metal. Repeated meltings will change the size of the crystals; it is therefore necessary that the character of the metal should be well understood. Very soft material for projectiles upsets on the shock of concussion, and very hard metal is apt to fracture.

The mode of applying sabots, and the material of which they are made are important. A hard sabot will transmit the shock of concussion to the shot itself, and tend to break off wedge-shaped portions or upset the base. Our correspondent speaks highly of the Thomas brand of iron which has a tensile strength of 18,000 lbs. per square inch, and the Hopkins' brand of cold blast, charcoal iron having a tensile strength of 24,000 lbs. to the square inch. He has never found any difficulty with either in practice.

Even sabots of papier maché, soft lead, or rubber, may, under certain conditions, cause the bursting of a gun by premature fracture, as when the gun has a gain twist if too fast, or the projectile is too heavy for the gun and the charge. Papier mache sabots, as usually manufactured in this country, contain potash combined with rosin as a binding material. The alkali absorbs and retains moisture, swelling the sabot.

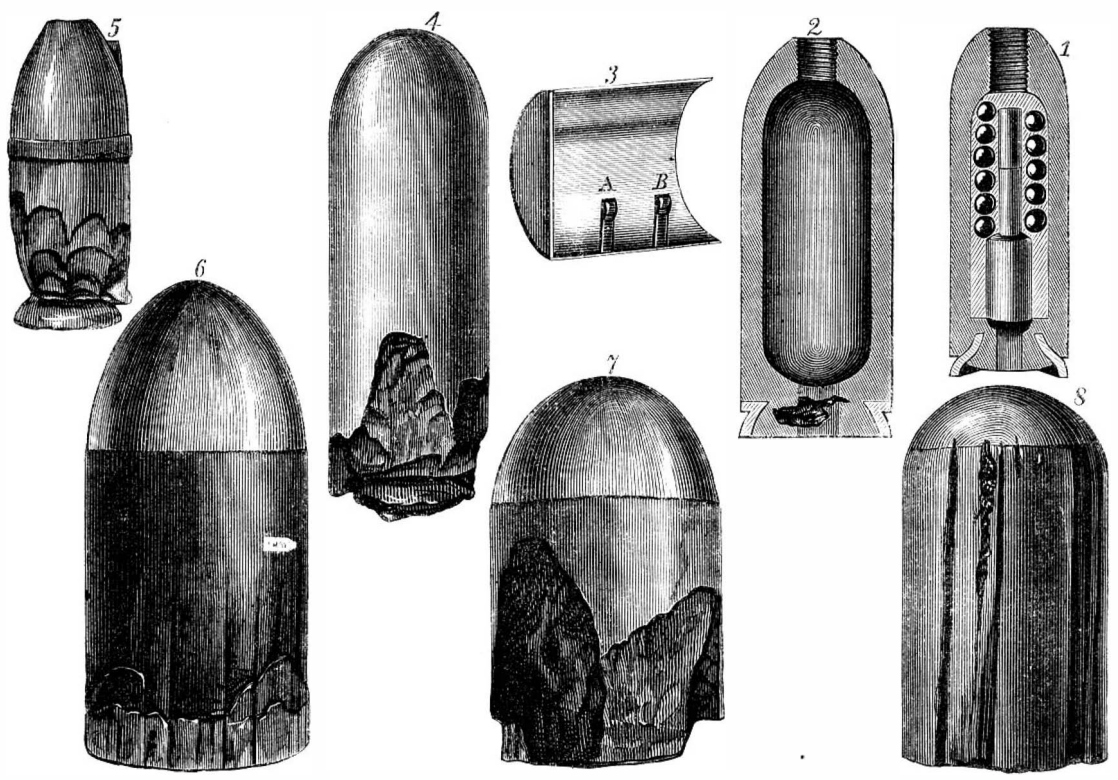
If a gun be loaded, the projectile having a papier maché sabot, and not fired until several weeks have elapsed, the sabot would have time to absorb moisture and swell, thus tending to burst the walls of the gun when acted on by the explosive force of the powder. A soft lead sabot has also a straining effect, especially when the gun is foul; it has no lubricating quality, but on the contrary retains grit, and is employed by the lapidary for this quality. Probably the bursting of rifled guns is often due to the wedging of the sabot in the projectile.

Fig. 1 is a sectional view of a 3-inch Parrott case shot. It will be seen that the sabot enters the base of the shot as a wedge. This is known as the Reed sabot. It is found in practice that this sabot has a tendency to break off pieces from the base of a projectile, which act as wedges, so that the projectile, itself, will take the grooves in the gun. Fig. 2 is a sectional view of a Parrott 20-pounder shell. It will be seen that the sabot does not enter the base as a wedge. But even this form does not save the shell.

Some believe that the unequal distribution of heat caused by the combustion of powder tends to the bursting of a gun. In Fig. 3 our correspondent shows a simple device for testing this question. He styles it a "gun pyrometer." The engraving is a sectional view of a metallic cartridge capable of holding one pound of powder. A and B are slips of common tinned iron; on A is soldered a composition of tin and lead which melts at 212°, and on B is a metal which fuses at 450°. The case, being charged with gunpowder, is placed in the piece and fired. On the removal of the cartridge case the metal fusible at 212° has melted and run down slightly, while that which melts at 450° has not changed. This has been repeatedly tried and in no case were the slips of tinned iron warped or injured by the heat, or the metal on B injured. It would seem that the repeated experiments which have been made by our correspondent with this pyrometer tend to show that a very small amount of heat is communicated to the gun at each discharge by the combustion of the powder. No doubt considerable heat is generated in rifled ordnance by the friction of the sabot and projectile, particularly in rifled guns, and in some cases the friction is so severe that the edges of the lands crumble, and the projectile will consequently jam in the gun, straining it more or less; still, the wedging or upsetting of the bases of projectiles may prove more destructive or injurious to the gun than the premature bursting of a shell while in the gun.

Fig. 4 represents a shot which was fired with one of the wedge-shaped Reed sabots seen in Fig. 1. It is a 30-pounder projectile and shows how the sabot broke off wedge shaped fragments. Fig. 5 is another illustration. In this case the base is preserved, but there is the same wedge-like fractures. Fig. 6 is an 8-inch Parrott shell. It will be observed that the wedges are formed, but held in position. Fig. 7 is an 8-inch solid shot, the sabot of which was of hard gun metal. The wedges extend up nearly the whole length of the cylindrical portion of the shot. Some of these hard metal sabots were removed and others of soft metal, composed of tin, lead, and copper, were substituted, and in no case were wedges formed. Fig. 8 represents a solid shot for an 8-inch Rodman. It has grooves to fit those in the gun. This shot requires no sabot. It will be seen that the condition of the grooves prove that they left the lands of the gun. On the fiftieth round the gun was burst.

The tendency of every shot in a rifled gun is to go straight forward; *i. e.*, leave the lands of the gun. Rotation of a shot is a forced motion, unnatural to the projectile, and it will be seen that with a high initial velocity the tendency of shot in such guns is to strain the walls. Then there is the strain from the upsetting or expansion of the base of shot, particularly of those using a sabot which acts as a wedge. Where the shot and gun, both, are of iron the friction on the lands of the rifling must be very great, and the action of the liberated gases and the direct line of the shot would tend to burst the gun; but the wedging of the fragments disengaged from the base of the shot must have an injurious effect on the gun. It seems as though the form and material of the sabot is a very important matter, and as it is easily seen that they affect the durability of the piece, greater attention to this matter should be given than that which it has heretofore received.



GUN PROJECTILES AND SABOTS.

The Galibert Respiring Apparatus.

The portable atmospherewhich we described lately, appears to be making its way into this country, as an aid to firemen—and why not to divers?—as well as to miners. The apparatus was subjected, the other day, in Chicago, to a public test in the presence of the Fire and Police Commissioners, representatives of the insurance interest, and others.

One of the cells of the central police station was made airtight, and in it was kindled a fire with straw and sulphur, which filled the place with smoke very dense and excessively irritating. Mr. T. Galibert, a brother of the inventor who lives in Chicago, pulled out the apparatus from the case in half a minute, inflated it in another minute and a half, equipped himself in forty seconds, and rushed into the cell. The door was closed on him and he was left to his fate, the stench coming through the door, which was open only an instant, being so intolerable that the watchers were glad to escape to the open air. Five minutes elapsed, and the watchers began to grow uneasy—ten minutes, and they could brook the suspense no longer. They called out to the man in the dungeon, to know if he were all right. He answered with a cheerful whistle, and was allowed to stay. At the end of about sixteen minutes he came out. Save that his eyes were a trifle red from a little of the fumes which had passed under the goggles, he was just the same man as when he entered. His pulse was 130.

John Kern, a member of the Hook and Ladder corps, then assumed the apparatus and entered the cell. He staid in it nine and a half minutes, saying on coming out that it seemed as if he could have kept on breathing half an hour, but that the fumes penetrated under the goggles and made his eyes ache. We may remark that this would not be the case in the smoke from an ordinary fire.

It was noticed that the operator had both hands free to work or carry out valuables, the bag at his back being a very slight incumbrance, being scarcely the size of the human body, and offering no obstruction to the passage of the wearer. The price asked for the apparatus is $150 each set, or nine for $1,000.

"WIRBEL-BEWEGUNG."

What is wirbel-bewegung? Who knows anything about wirbel-bewegung? The secret has just been extracted that the round world and they that dwell therein, the big whales and little fishes, gorillas and anthropologists, the sun, the moon, the stars—nay, the foundations of the wide universe itself, are all wirbel-bewegung. The readers of *The Engineer*, the editor, the paper, the printing-ink, and the printer's devil, are wirbel bewegung root and branch. Historical personages, Henry VIII., the Holy Maid of Kent, Mr. Disraeli, the Cock-lane Ghost, Mr. Gladstone, the Thirsty Woman of Tutbury, the Vicar of Haverfordwest, the great Mogul, the reform league, Landseer's lions, and Balaam's ass, are all nothing more nor less than wirbel-bewegung. Who made the discovery? Professor Sir William Thomson, of the Atlantic cable, who first announced it a few days ago, to an assemblage of learned philosophers, with Sir David Brewster at their head, at a crowded meeting of the members of the Royal Society of Scotland. The first publication of such an announcement in England is of itself a mighty task, but now that the first burst is over and the secret out, breathing time may be allowed, and the details calmly considered in fresh paragraphs. We are now as exhausted as the hero of old, who took a run of three miles to jump over a hill, but having reached the bottom of it sat down to rest, and then walked over at his leisure.

A lump of any solid simple substance is reasonably assumed to be built up of a number of atoms of that substance, but such particles have never been seen, being infinitely beyond the ken of the most powerful microscope, so on this point there is fine scope for the exercise of the imagination. Let a poker made of the simple substance iron be made red hot in the fire, and it will grow longer than it was when cold; hence its constituent particles have the power of motion. In fact, heat in a body can be proved to be nothing but motion, and as absolute absence of heat represents a degree of cold that has never been attained upon earth, the atoms of all bodies are known to be in a state of motion. What that motion is, or what the atoms are like, nobody knows, so it has been assumed by many philosophers that the particles are incompressibly hard and infinitely rigid. "But," it has been argued, "it is impossible to imagine an atom so small that it cannot be cut in two; therefore, matter may be infinitely divisible." In this case it would not be matter at all, but a series of forces emanating from points, so that the universe may be built up of laws rather than of material substances. As it is, therefore, quite as impossible to prove as to disprove the existence of solid matter, the dilemma forms a very pretty puzzle, and the leading votaries of physical science at the present day are divided, without much dogmatism on either side, into two classes, the materialists and the immaterialists, and the ranks of the latter seem day by day to be gaining ground.

Professor Thomson based his communication upon the admirable discovery of Helmoltz of the law of vortex motion in a perfect liquid, that is to say, in a probable fluid destitute of viscosity or fluid friction. Helmoltz has proved mathematically an absolute unchangeability in the motion of any portion of a perfect liquid, in which the peculiar motion he calls "wirbel-bewegung" has once been created. Professor Thomson, therefore, boldly throws down the gauntlet, by condemning "the monstrous assumption of infinitely strong and infinitely rigid pieces of matter," and suggests that Helmoltz's rings are the only true atoms. Further, he managed, in the presence of the audience, to make some large vortex rings in the imperfectly elastic fluid, air, and to render them visible to the audience in the following curious way:—He took a large wooden box filled with smoke—any smoke will do, such as that obtained by burning magnesium, or by placing two jars in a box, one filled with ammoniacal gas and the other with hydrochloric acid gas. At one end of the box there was a round hole, and at the opposite end another and larger opening. Every time a cloth or piece of wood was flapped against the larger opening, of course a sharp puff of air laden with smoke in suspension shot out through the opposite round hole. These puffs instantly took the form of smoke rings and floated about the room, and were frequently seen to bound obliquely from one another, shaking violently from the effects of the shock. They rebounded from each other and trembled in much the same way that two india-rubber belts would do under the same circumstances. Had these rings been formed of a perfect fluid they would, as Helmoltz has demonstrated, have kept up the wirbel-bewegung motion to all eternity.

"A full mathematical investigation," said Professor Thomson, "of the mutual action between two vortex rings of any given magnitudes and velocities, passing one another in any two lines, so directed that they never come nearer to one another than a large multiple of the diameter of either, is a perfectly solvable mathematical problem, and the novelty of the circumstances contemplated presents difficulties of an exciting character. Its solution will become the foundation of a proposed new kinetic theory of gases." He proved that if two such vortex atoms were interlinked, nothing could ever separate them, for one line of vortex motion could never pass through another line. Thus such a double atom might much vary in shape yet remain essentially the same.

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Here, then, is a new basis for all physical science with a vengeance. Since the time when a perfectly elastic fluid was acertained with tolerable certainty to permeate the universe, and to convey the vibrations of light from the sun to the earth, philosophers seem to have rapidly grown more etherial in their ideas respecting the construction of solid bodies. The discovery also of the grand law of the conservation of energy, of the total indestructibility of force, has brought the minds of men of science into a state which prepares them to listen with considerable attention to novel ideas like that of vortex atoms, which bases the existence of solid bodies upon an all pervading energy rather than upon crude lumps of matter which have never been seen. Those who have had much to do experimentally with the imponderable forces, especially electricity and magnetism, the latter of which now presents phenomena shrouded in the densest mystery, are inclined to think the theory of solid atoms of hard matter far too crude to meet in any degree the observed facts. What is the reason that this mysterious force deflects magnetic needles in the observatories at Kew and Lisbon at the same instant of time? Does the force come from the sun? Does it traverse the hypothetical ether in vibrations like those of light? Mr. Varley, who probably knows as much about electricity and magnetism as any man living, has no faith in the idea of the existence of hard rigid lumps as ultimate atoms, and has in his researches, discovered that these imponderable forces have some properties which are commonly ascribed only to solid matter.

So wirbel-bewegung is vortex motion. In all ages mysterious powers have been ascribed to the circle. A serpent with its tail in its mouth has long been considered the fittest emblem of eternity. Dancing dervishes, devotees of wirbel-bewegung, for centuries have achieved a meritorious amount of devotion by spinning around upon one leg. The lamas of Thibet pray by machinery, their petition being printed upon small windmills, which rotate right merrily in every passing breeze. Sometimes, it is true, the wind chances to fail, but a band over the smoke-jack in the chimney furnishes the necessary mechanical power, to grind the prayers. The world is circular, and travels round the sun in a circle, the moon twists round the earth in a circle, the sun dances round his axis in a circle, and is supposed himself to travel in a circle, round the star Alcyone, the center of another circle, so there is plenty of precedent for Professor Thomson's idea that atoms whirl in circles, and that the heads of philosophers spin round in an endless wirbel-bewegung. Astrologers and other clever men found this out long ago, so made their bodies spin round when performing their incantations. Dr. Aldrovando, first physician to Prester John, leech to the Grand Lama, and hakim in ordinary to Mustapha Muley Bey, is recorded by one of the fathers of the Church, to have thus, by unholy rites, obtained power over the spirits of the nether world.

"On one side was an article bearing a strong resemblance to a coffin; on the other was a large oval mirror in an ebony frame, and in the midst of the floor was described in red chalk a double circle, about six feet in diameter, its inner verge inscribed with sundry hieroglyphics, agreeably relieved at intervals with an alternation of skulls and cross-bones. In the center was deposited one skull of such surpassing size and thickness as would have filled the soul of a Spurzheim or De Ville with astonishment. A large book, a naked sword, an hour glass, a chafing dish, and a black cat, completed the list of movables. The doctor seated himself in the center of the circle upon the large skull, elevating his legs at an angle of 45 degrees. In this position he spun round with a velocity to be equaled only by that of a tee-totum, the red roses on his instep seeming to describe a circle of fire. The best buckskins that ever mounted at Melton soon yielded to such rotary friction—but he spun on—the cat mewed, bats and obscene birds fluttered overhead."

Now here is a clear case of wirbel-bewegung, known to a scientific man of the days of old. Now-a-days, whenever a discovery is made, some good-natured friend of the promulgator always rises to say it is not new; as was the case with Mr. Wilde's new magneto-electric machine, so here is a clear case against Professor Thomson. Probably he made his discovery by going through the ceremonial incantations laid down by the illustrious Dr. Aldrovando, but this is one of those grave secrets which his tailor only can unravel. The scientific world now travels onward at a rapid rate, and who knows whether before long the canny folks in Glasgow may not see their learned townsman building himself a house of solid matter, made by banging smoke-rings out of a wooden box with a damp towel?—*The Engineer*.

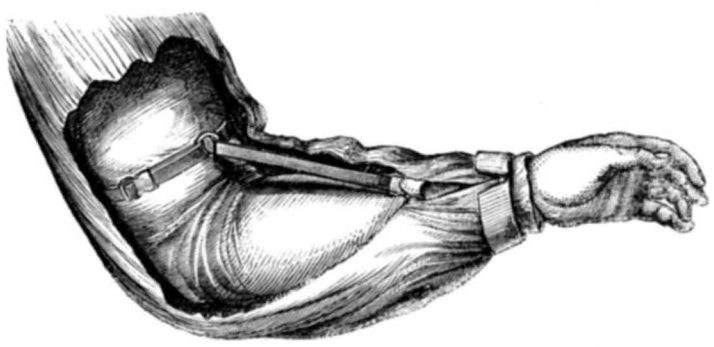
THE PALM OF THE INDIAN ARCHIPELAGO, according to M. Maxime du Camp in the *Revue des Deux Mondes*, furnishes from the envelope of its trunk and stalks a peculiarly valuable fiber for covering telegraph cables. An anchor fished up after 60 years submersion, had a piece of native cable from this substance attached, which was as strong as when new. A sugar manufacturer in Java has used a mattress of the same material in the river which supplies water to his establishment, as a filter, for the last twenty-five years, submerged during four months and hung up in the torrid sun the rest of the year; yet the mattress is as sound and strong as ever. The application proposed is about to be tested, as the submarine cable between Batavia and Singapore has been covered with a tissue of *aren*, as it is called by the natives, and in a few years will afford some evidence in regard to its value.

A RODMAN GUN FOR THE BRITISH GOVERNMENT.—One of these guns of 15 inches calibre has been cast for the British Government for experimental purposes, and will shortly arrive in England.

POWELL'S SLEEVE SUPPORTER.

In the labors of the household, the store, shop, and laboratory the annoyance of long or drooping sleeves is one which all more or less feel. The plan of slipping an elastic over the arm is not half efficient, and the rolling up or tucking of the shirt or dress sleeve is apt to deface the smoothness of the fabric.

The engraving shows a simple device for keeping the sleeve in a proper position when at work, that appears to answer the requirements without the annoyances of the temporary contrivances generally employed. It is merely a strip of flat silk elastic, one end of which is attached to a slide of sheet metal and the other to a hook. The hook end passes



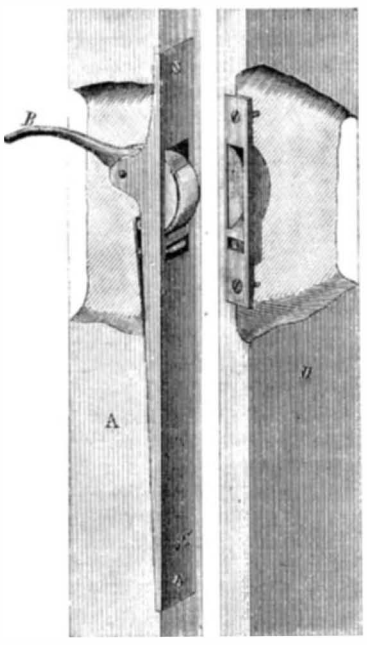
through a ring engaging with the loop formed by the slide and the elastic itself. The loop formed by the slide and ring is slipped over the arm above the elbow and the hook drawn through and attached to the opening above the wristband.

It will be seen that the movement of the hand controls the elasticity of the band and also that the tension can be regulated by the slide. It seems to be just what is needed by hundreds, as it can be used under all circumstances. It was patented through the Scientific American Patent Agency March 19, 1867, by Thomas Powell, Milroy, Rush Co., Ind., whom address for other facts relating to the device.

BUTTERWORTH'S IMPROVED WINDOW SPRING.

The breaking of window weight cords, the difficulty of putting in new cords, and the annoyance of rattling window sashes have stimulated many inventors to provide a substitute for the sash weight and at the same time to produce a lock for the sash to hold it in position. The engraving shows one which was patented March 24, 1863, by J. C. Butterworth Jr., of Providence, R. I. It is simple and always direct acting.

On the sash frame, A, is a plate of metal mortised into it, and carrying a spring lever, B, having at its outer end a segment of a circle the face of which is of elastic rubber intended to have a bearing against the window frame in which the sash slides and to hold the sash firmly against the other side of the window frame. This segment is held in place by a flat spring of steel, riveted to the plate at C, and bearing at



the other end against the segmental portion of the lever. Riveted to this spring is a projection of metal that passes through a corresponding aperture in the plate on the window frame, D, to lock the window when closed. By placing these plates at desirable distances on the window frame, the window can be locked at any point desired. The plate on D, has a semicircular recess to receive the segment of the lever, B, at any point to prevent unnecessary strain upon the spring.

By raising the end of the lever, B, the segment is receded and the sash left free, so that the sash can be readily raised; by releasing the lever the spring forces the rubber surface against the window frame or engages the projecting snug with the mortise in the plate on the window frame. The lifting instead of the depression of the lever assists the contrivance in raising the window, being in this respect superior to those window latches which operate in a reversed manner.

J. C. Butterworth Jr., Providence, R. I., will furnish the springs or give any information desired relative to the price, action, etc., of this device.

THE ATLANTIC AND PACIFIC TELEGRAPH COMPANY has been organized to build a new line through from New York to the Pacific. The division from New York to Buffalo is to be completed by the first of next September.

HUB-BORING MACHINE.

This contrivance is intended for wheelwrights and carriage makers who do not have stationary machinery or power to assist them in their business. It is a hub-boring machine worked by hand. The usual way to bore hubs by hand is to use first an auger which bores a straight hole and then to ream out the hub thus made with a conical pod auger or semicircular conical reamer. To do this two tools are necessary but with this machine only one. The cutters are carried on the shank, A, on which is a stop, B, to regulate the depth of the shoulder. The lever nuts, C, clamp the hub, and their screws are secured to a disk in which traverses an eccentric that, by a set screw, D, and a plate seen in front determines the taper of the hole to be bored. E is an open nut by which the cutters can be drawn back to the butt of the hub without turning the handle or shank.

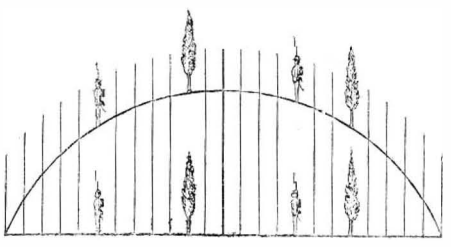
To bore a box, set the machine on the hub, then measure the distance from the eccentric plate to the nut, E. Make a drawing of the iron box which is to be seated in the hub, giving an outline with center and side lines extending down to the face of the open nut, E, giving the small end of the hole intended a continuation to the top of the diagram. Set the cutters one half the diameter of the small end of the hole gaged from center of the shaft and bore through the hub. Then move the eccentric plate by the set screw, D, to half the taper required and bore through again. The result will be a taper to fit the box.

The work can be done quickly and with certainty of satisfactory results. When accustomed to the machine, the workman will not require a drawing, but will be able to judge by the eye how to set the cutters.

For further information address Ira B. Gage, of Constantine, Mich.

UPRIGHTS ON A PLANE AND ON A CURVE.

A correspondent from New Hampshire writes as follows: "I would ask your opinion of the picket fence question discussed lately in the columns of the New York *Ledger*. Mr. Bonner cannot be convinced that it would not require a greater number of pickets of a given width, placed a given distance apart, to build a fence over a hill than if they were placed on a level plane running from the same points on either side of the hill. I say it will take the same number for each, and would like your opinion."



We have not read the discussion referred to, but we think our correspondent is correct. By reference to the above diagram in which the curve represents the hill, or reversed, a valley, it will be seen that the same number of upright objects, either fence pales, men, or trees can be placed on a level as on a curve; that it requires no more to occupy the same horizontal distance on the convex or concave curve than on the plane. That the surface distance is greater on the curve than on the plane is apparent, but in the case of upright or vertical objects the horizontal distance is the same in both cases. No more trees can be planted on a hill side than on a level representing the same horizontal distance. The diagram appears to be a perfect demonstration of the matter.

MORE UNPLEASANT COMPARISONS.—Among the many tokens, small and great, of the arousing of a German giant to take the place of England in commercial, political and perhaps maritime supremacy, are mentioned the twin significant facts, that while business is languishing in England, the Berlin Railway Plant Company and a Stettin shipbuilding concern, the "Vulkan," have both made enormous dividends in the last year, being respectively ten and eleven per cent.

GOOD WORKMANSHIP.—A locomotive constructed in the workshops of the Orleans Railway company, has run 93,150 miles, in three years, without submitting to any repairs. The engine is to be exhibited at the Exposition, and is worthy of it.

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Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

[For the Scientific American.]

STRENGTH OF MATERIALS.

In the construction of machinery, mill-work, bridges, etc., the builder is called upon to calculate the dimensions which must be given to each part of the machine or structure in order that it may safely sustain the strain or load which is to act upon it. Before these calculations can be made, it is necessary to determine the nature of the strain acting on each part; that is, whether it is subject to a *pulling, thrusting, bending, shearing,* or *wrenching force,* and also the amount of resistance which the material, used in the construction of the parts, offers to these forces. The first can be determined generally by an inspection of the machine or structure; and the second by reference to a table containing the average breaking load, per square inch, of the most important materials as found by experiment. The following is a table for extension:—

METALS.—Brass—cast, 15,000 lbs.; wire, 40,000. Copper—cast, 16,000; sheet, 30,000; bolts, 35,000; wire, 50,000. Iron—cast, 17,000; plates, 50,000; double-riveted joints, 35,000; single-riveted joints, 28,000; bars and bolts, 60,000; wire, 70,000. Lead—sheet, 3,000. Steel—bars, 100,000; plates, 80,000. Tin—cast, 4,500. Zinc, 7,000.

WOOD.—Ash, 17,000 lbs.; beech, 11,000; birch, 15,000; chestnut, 11,000; elm, 14,000; locust, 16,000; oak, 10,000; red pine, 13,000; white pine, 10,000.

The resistance which a piece of any material offers to pulling force in the direction of its fibers is proportional to the area of the smallest cross-section. Hence, if we represent the area of this cross-section in square inches by A, the breaking weight in above table by W, and the strength of the whole piece by S, we have S=A W; or in words, the strength of any piece, subject to extension, is equal to its area in square inches multiplied by the breaking weight found in the table.

Materials acted upon by a thrusting force or pressure give way by crushing when the hight or length is small compared with the least diameter or thickness. Articles of cast iron in which the length is not more than five times the diameter, and of wrought iron in which the length is not more than ten times the diameter, come under this head. The resistance which materials offer to compression is proportional to the smallest cross-section, hence the calculation for resistance to compression is the same as that for extension, with the exception of the value of W, which is to be taken from the following table, which gives the ultimate resistance to crushing per square inch:—

NATURAL AND ARTIFICIAL STONES.—Brick, 1,000 lbs.; granite, 6,000; marble, 4 000; sandstone, 3.000.

METALS.—Brass, cast, 10,000 lbs.; iron, cast, 110,000; iron, wrought, 3,500.

WOOD.—Ash, 9,000 lbs.; beech, 9,000; birch, 6,000; elm, 10,000; ebony, 18,000; pine, 5,000; lignum vitæ, 9,000; mahogany, 8,000; oak, 6,000; teak, 12,000.

The value of W, or the breaking weight per square inch in the above tables is the ultimate. In practice it is usual to take one sixth of this for metal and one tenth for wood and stone as the *safe* strain for materials. The safe strain or fraction of the breaking strain to be taken will vary with the nature of the structure and the cautiousness of the constructor. In machinery, railroad bridges, etc., which are liable to sudden strains, the fraction of the breaking weight to be taken must be smaller than that which is taken in the construction of roof trusses, etc., which are comparatively free from sudden strains.

When the length of pillar and posts exceed the diameter or least dimension considerably, they give way by bending and breaking across. The following table gives the safe strain per square inch. L=length in feet, and d=diameter in inches.

	Pine.	*Oak.*
$L \div d = 8$	500 lbs.	350 lbs.
$L \div d = 12$	250 lbs.	200 lbs.
$L \div d = 24$	150 lbs.	125 lbs.
$L \div d = 48$	100 lbs.	75 lbs.

The breaking weight of solid cylindrical columns of cast iron, the ends being incapable of motion, in tuns of 2,240 lbs., is $44 \times d\ 3{\cdot}6 \div L\ 1{\cdot}7$, in which d represents diameter in inches and L length in feet of the column. Pillars and posts with movable ends break with one third of the above load. A piece of machinery is often subject to alternate extension and compression, and when this is the case it must be of the proper dimensions to sustain the strain to which the material composing it offers the least resistance. The piston and connecting rods of engines are examples, and must be proportioned to resist compression, because wrought iron of a given cross section offers less resistance to a thrust than to a pull.

Materials which are acted upon by a force perpendicular to their length, such as beams, give way by bending, the material on the concave side being compressed and on the convex side extended. If we represent the length of a beam in feet by L, the depth in inches by h, the breadth in inches by b, the resistance of the material to bending by W, and strength of the beam by S, we have the following formula for the strength of a beam fixed at one end and loaded at the other: $S = \frac{W b h^2}{L}$. If the beam is fixed at one end and the load is uniformly distributed over it, the strength will be, $S = 2\frac{W b h^2}{L}$. If supported at both ends and loaded in the middle the strength will be, $S = 4\frac{W b h^2}{L}$. If supported at both ends and the load uniformly distributed over it, the strength will be, $S = 8\frac{W b h^2}{L}$.

The value of W to be used in the above formula is given in the following table:—Iron, wrought, 750 lbs.; iron, cast, 600 lbs., oak, 150 lbs.; pine, 110 lbs.; spruce, 90 lbs.

Keys, pins, bolts, rivets, screws, etc., are acted upon by a shearing force. It is of great importance to have these small parts properly proportioned. The strength of a chain is only equal to that of its weakest link, and it may be said that the strength of a machine is only that of its weakest bolt, key or rivet. It is also a matter of economy to have these parts of the proper size, since the material of the principal parts is wasted if the bolts, etc., are too weak, and weakened by the necessary boring and cuts if too strong.

The following table gives the ultimate resistance to shearing, in pounds per square inch:—Iron, cast, 30,000 lbs.; wrought, 50,000 lbs.; pine, 500 lbs.; oak, 1,600 lbs.

Axles and shafts are acted upon by a wrenching strain or force. If d represent the diameter of a shaft in inches, l the length of a lever or crank in inches, F the force in pounds applied to this crank, and W the safe load for the material, we have the formula, $d = \sqrt[3]{5{\cdot}1\ Fl \div W}$ = diameter of the shaft. The value of W for wrought iron is 9,000 lbs., and for cast iron 5,000 lbs.

C. K. W.

"The Measure of Force."

MESSRS. EDITORS:—As Mr. Henry F. Walling's reply to "A Subscriber," (page 266 present Vol. of the SCIENTIFIC AMERICAN) may mislead your readers as to some of the important facts stated in my previous communication, allow me to say, that if "no particular change in the logic of events relative to the effects of force upon matter has occurred since the days of Newton," then, it is impossible that "discoveries in modern physical science, seem to indicate that new and important developements are near at hand," for it is only newly discovered effects of force upon matter that can possibly indicate the anticipated developments. Recent discoveries relating to the dynamical theory of heat, and the correlation of forces, are events sufficiently logical to show that all forces however derived, acting on a unit of weight, with the same intensity, and through the same space, necessarily have the same measure; and that like measures of the same intensity, contain like measures of the force which actuates it. Hence, the demonstration in my former communication, that the absolute quantity of dynamic force, is as the weight of matter and square of its velocity.

A SUBSCRIBER.

Tenafly, N. J. April 22, 1867.

Rule for Tank Staves.

MESSRS. EDITORS:—On page 217, present volume, your correspondent, C. Goodwin, gives a rule for getting the width and taper of the staves for a tank, which is the rule used by all workmen engaged in that business, and the only correct one yet discovered, but he only gives half the rule as practically applied.

The straight edge which he nails to one of the outside radial lines is the try square or bevel for jointing the staves, and will make a perfect fit. The outside of the staves should be rounded to the concave edge of the gage, and to make a very nice job the inside may be hollowed out to the convex edge, but that is not usual.

I deem the above necessary to complete his article.

M. H. SCOTT.

Newark, N. J.

Molecular Attraction in Steam Boilers.

A. S., of New Jersey, referring to the article headed "Hints to Inventors on Steam Condensers" on page 282 current volume, says that the fact of water in steam boilers contains but a modicum of air, and that explosions occur under circumstances most favorable to this condition, has led to an invention patented in this country and Europe for detecting the danger. It consists of thermometric and pressure devices operated by the slight variations between the pressure and temperature of the water, and giving an alarm. It seems to us, however, that this tell-tale is only part of the requirement. There should be a means of returning the water to its natural condition, so that the temperature and pressure should be kept at all times in proper ratio one to the other

Gleanings of the Paris Exposition.

There are 42,247 exhibitors.—The English space in the machinery gallery—about one sixth of the whole—is already occupied to the last inch, and most of the machines have already been in motion.——Pocket compasses are sold in great numbers, to assist the wanderers through the vast labyrinth. These compasses have their dials inscribed with a plan of the national divisions of the building, and thus the visitor perceives by his compass the exact direction from his position of any part he may wish to reach.——Artificial stone of several excellent varieties is exhibited. Ransome's patent concrete stone (English) is spoken of as very beautiful, exhibiting entire freedom from contraction in setting, and a hard and sharp perfection in the finest angles. The Kufstein cement is illustrated in the Austrian department by a large Gothic church window produced in one casting. This material is produced by calcining a natural stone found in the vicinity of Kufstein, in the Tyrol, which has some of the qualities of Portland cement. The mosaic cement of Vicat & Co. consists of a large-grained conglomerate of mixed fragments, united by cement, and when polished has the appearance of mosaic. The *beton agglomere,* which has found extended application in France, is exhibited mostly in the form of sculptures, for which its dull brownish gray is not happily suited.——The Haswell patent press-forgings, made in Vienna, are exhibited in the Austrian department, including a wrought iron locomotive cross-head squeezed out of a solid block, even the opening for the connecting rod being pressed in. A locomotive crank, pressed complete at one operation, is also shown.——A very large complete forging by Marrel Frères, is a 30-tun marine shaft with three cranks, all forged solid in their positions, instead of being forged in one plane and then twisted, as is usual. Sixty tuns of iron were used in forging this shaft, one half the metal being wasted in the process. The piling was done in layers crossing each other at right angles or diagonally.——Twenty-two steel railway wheels, cast in one piece, on a steel shaft, with their bosses or hubs connected, and with a single runner 6x3 inches connecting their circumferences, but otherwise standing clear of each other and about one foot apart, are exhibited in the Prussian department, from Bochum. It is a disputed question whether they were cast on end in a deep pit or in a horizontal row from a number of runners. Bochum also exhibits the largest steel bell in the world.——Much interest is manifested by the foreign press in an American machine for making molds for stereotype plates by the compositor, who sits at a keyboard like that of a type-setting machine, and instead of setting up his types in a stick or case, impresses their faces upon *papier mache',* and forms a matrix or mold from which the stereotype is cast. Whether the compositor is expected to be infallible, or means ingenious enough for correcting erroneous impressions are provided, we are not told.

An English View of the Dunderberg.

While we have been discussing the possibility of handling heavy ordnance in broadside, and experimenting with various mechanical devices for working 9-inch guns, suggested by naval commanders, amateur engineers, and artillery officers, the Americans have left the solution of the problem to an experienced engineer. Consequently they have got the start of us, and already mounted their ponderous 15-inch guns in broadside, as our readers will see by the engraving in our present number, copied from an admirable drawing of the battery of the U. S. ironclad ram Dunderberg, forwarded to us by Captain Ericsson.

Although it is our intention, on the present occasion, only to describe the means adopted for working the 15-inch gun in broadside, we cannot omit to call our readers' attention to the vast proportions of the battery of the huge Dunderberg; nor can we omit to direct their attention to the form of this unequaled battery. It resembles a citadel with the guns pointing in all directions. There are twelve broadside guns and five guns at each end of the ship, pointing not only fore and aft, but diagonally, as will be seen by the distant ports represented on the transverse section of the battery. Our readers cannot fail to notice that, owing to the extraordinary capacity of the battery, the gundeck being nearly 70 feet wide, the enormous guns—12½ feet round the breech—appear to be but little above the ordinary size.

The simplicity and strength of the slide merit special attention. Unlike our slides, which are composed of a number of plates and angle irons, it is formed with two single bars of wrought iron 4 inches thick and 10 inches deep, provided with solid lugs near the ends slotted out to receive the conical friction rollers. These bars are held together by cross pieces, the forward one being provided with a nose-piece, through which the fighting-bolt passes. Some idea may be formed of the strength and proportions of the mechanism employed for working the 15-inch gun, when we state that the fighting-bolt is six inches in diameter, made of wrought iron, with a thin coating of composition metal, to prevent corrosion. It will be observed that the rear ends of the bars are bent upwards in order to afford support for cushions, against which the carriage may strike in case of neglect or accident to the friction gear. Naval engineers will not fail to notice this expedient, the only adequate one we have seen, for stopping a 20-tun gun which chances to recoil unchecked under a 70lb. charge. The main feature, however, of the arrangement is the rotary conpressor by which the recoil is regulated and checked. Our naval authorities will do well to study this singular device for saving labor and time, which at the same time, renders it not only possible but easy to work guns of any weight during the heaviest rolling, since the mere dropping of the check-handle absolutely locks the carriage on the slide. The training of a 20-tun gun with steadiness and security while the ship rolls some 15 or 20 degrees may be regarded as a task nearly as difficult, more particularly if the condition be coupled with it of dispensing with men at the rear of the slides. The means adopted by Ericsson for effecting this object and complying with the stated condition on board of the Dunderberg require but a brief description. A winch with handles in opposite directions, is placed half-way between the ports. By means of two sets of cog-wheels and a rack connected by a joint to the slides, the turning of the winch enables the gunners to point the piece with great accuracy and steadiness, and to hold it in any position. The advantage of placing the training gear and the men between the ports out of danger from missiles entering through the port commends itself. Also the advantage of removing the training crew from the rear of the slides, as it enables the gunner more freely to sight and direct the training.—*Engineering.*

DR. T. ANDERSON has reported to Government that great success has attended the introduction of the mahogany tree into the Calcutta Botanical Gardens. Dr. Anderson believes that the mahogany tree might as easily be spread over all parts of Bengal as the larch has been in Britain.

IN THE RHINE DISTRICT grape vines are kept low and as near the soil as possible, so that the heat of the sun may be reflected back upon them from the ground, and the ripening is thus carried on through the night by the heat radiated from the earth.

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How to Make French Calf Skins.

The standing of "French calf" in our market and among wearers of leather everywhere, of itself justifies the assertion in the *Shoe and Leather Reporter* of one who has personally investigated the leather manufactories of France and Germany, that the tanning as well as the finishing of calf and upper leather in those countries are so distinct from the processes carried on in England and the United States, that they can hardly be said to be the same in any particular: indeed in many respects they are the opposite of each other. Premising the obvious remark that the best system must still depend for the superiority of its product upon a mechanical excellence in the worker to which no careless or hasty apprenticeship can ever lead; we give for the benefit of our leather manufacturing readers the observations of this American manufacturer on the process of tanning in France.

The proper classification of the stock before the manufacture is commenced, is made a point of great importance. The size and particularly the substance and condition of the pelts in the same pack must be similar. The liming and indeed all the after processes, require uniformity of substance and condition, under an adapted treatment.

Next in importance is the proper softening of the hide, which is not merely softened, but the nerve is broken with great care. That is, the fine nervous tissue, which lies interlaced so closely on the flesh, as to almost present to the naked eye a compact surface, is so distended as to overcome its elasticity and break it up. The effect on the pelt is to make it pulpy. The result is more difficult and the appearance more deceptive, evidently, in a green than in a dry skin, and consequently nearly all calf skins tanned in France and Germany are dried before they are soaked. By the extreme labor required to break the nerve thoroughly—and here, how indispensable is the most thorough skill and fidelity in the workman—all the flesh is worked off without using the sharp edge of the tool. The liming is then done very much as among us, but from the very careful preparation they have already had, the skins take the lime more readily than with us. Again, the bating of the skin is performed with much more labor and more frequent workings than with us. They get the lime out of the skin, and reduce it low. The coloring is done in a tub eight or ten feet in diameter, and two feet deep, or in "England's wheels," by creating a current of liquor which revolves the skins.

When the skins are thoroughly colored, and fairly begin to plump, they are laid away in round tubs or tanks, carefully sized, and laid grain to grain, no bark being allowed between the grain surfaces. The object is to prevent "pitting" and overtanning of the grain. The tanning proceeds inward from the flesh side, and the grain thus obtains, (or retains) the peculiar toughness, with uniformity of color, which is one of the standard virtues of French calf. Thus mated, the skins go through in pairs. They are laid away in dry bark, and water or weak ooze is pumped on when the tanks are full. The bark is used several times, and the new bark never touches the skin until nearly tanned. The acid of the oak bark thus preserved tends to destroy the lime that may have been left, and to bleach the color, and make the grain fair and uniform.

A WIDE SPREAD organization has been completed in France, by which delegates from every part of the empire, skilled in their trade or occupation, will be enabled to study the Exhibition for the benefit of their fellow workmen.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

BUCKLE.—Joseph Barrow, Mobile, Ala.—This invention consists in a construction of a buckle whereby it can be readily fastened to or unfastened from the article upon which it is to be used.

SAFETY ATTACHMENT FOR KEYS OF DOORS.—D. E. Campbell, Boston, Mass.—This invention relates to a safety attachment for keys of locks the object of which is to enable the key to be so fastened in the key hole of the lock that it can be neither turned around or pushed out.

WELL TUBE.—Hiram Knapp and Warren H. Pease, Goshen, Ind.—The principal object of this invention is to prevent quicksand or gravel from entering the well tubes when driven into the ground.

HAND SPRING FOR MACHINERY.—Parley Howe, Staffordville, Conn.—This hand spring is intended more especially for the starting and stopping of looms.

CARBURETING GAS AND REGULATING ITS FLOW.—George W. Porter, Boston, Mass.—This invention consists in passing the gas through a series of walls or partitions composed of capillary substances and also in regulating the flow of the gas through such partitions by increasing the density or altering the condition of the walls or partitions through which it passes.

PICKER MOTION.—Wm. Nugent, North Providence, R. I.—The object of this invention is the improvement of picker motions for looms and it consists in a peculiar device for preventing the rocker from jumping out of its place on the rail, and in constructing the picker so that when it strikes the shuttle it will not cause the latter to jump up or tilt so as to bring its nose up against the warp, but will cause it to be impelled along the race without rising or tilting, the picker staff being allowed to rise from its rail by reason of a slot in the block which carries the staff and for the purposes of adjustment to be moved in a horizontal direction by reason of a slot in the rail.

SKATE.—Charles Gooch, Cincinnati, Ohio.—This invention relates to clamps for securing skates to the soles of boots and shoes which clamps are of such construction that they can be readily applied and adapted to any of the ordinary wooden frame skates.

CARRIAGE JACK.—T. L. Goble, Bradford, N. Y.—This invention consists in an arrangement for raising the wheels of a carriage or other vehicle from the ground by operating a nearly horizontal rail by a lever which is hung or pivoted eccentrically to a standard.

BRIDGE TRUSS.—Gervaise B. Manley, Cogan's station, Pa.—This improvement relates to the construction of trusses for railroad and other bridges of wrought iron and consists in the manner of connecting and interlocking the strings and braces or suspension bars whereby are combined great strength and security, simplicity, economy and durability.

HOOP MACHINE.—John J. Alvord, Tecumseh, Mich.—This invention has for its object to furnish an improved machine by means of which the hoop may be cut at one stroke of the knife, and the table tipped automatically to give the proper bevel to the hoop.

WATER METER.—Thomas Green, Brooklyn, N. Y.—The object of this invention is to furnish a cheap, durable and reliable meter to be attached to service pipes in cities for registering accurately the passage and consumption of water. A device of this kind is much needed to regulate the consumption of water supplied by public water works, especially in large cities where the reckless waste and improper use of water often occasions serious public inconvenience.

FENCE.—Walter Reed, Wayne, N. Y.—This invention has for its object to furnish an improved fence, simple and cheap in construction, easily and quickly put up and taken down for storage or transportation.

BOAT-BUILDERS' PLATFORM.—James Granger, Zanesville, Ohio.—This invention has for its object to furnish an improved platform by means of which flatboats and other vessels may be conveniently built bottom upwards, and from which they may be easily launched.

WASHING MACHINE.—Joseph W. Bradley, Rockport, Mo.—This invention consists in constructing a cylinder of peculiar shape which cylinder is revolved in a suitable box and into which the clothes are placed to be washed.

STOVE.—William W. Carpenter, Middletown, N. Y.—This invention consists in arranging pipes or tubes within the furnace of the stove, which pipes have communication with the air outside of the stove and through which a current of air constantly passes from the lower to the upper portion, and is discharged in a highly heated state.

COUPLING FOR HOSE AND PUMPS.—J. W. Douglas, Middletown, Conn.—This invention consists in constructing in a simple, cheap and novel manner, a coupling which may be used for coupling hose or pumps to their base or to pipes or tubes. It more particularly consists in a peculiar and novel lock which holds the coupling; the sections of which may be quickly adjusted and secured in their position by means of an eccentric nut which renders it light, strong and not liable to wear and get out of order.

DERRICK.—James S. Lester and Lyman G. Jennings, La Fayette, Ind.—This invention has for its object to furnish an improved derrick for raising, brick, mortar, and other building materials to the place where they are to be used.

CARPET STRETCHER.—Willis Weaver, Salem, Ohio.—This invention has for its object to furnish a simple and convenient instrument for stretching carpets upon the floor so that they may be conveniently secured in place.

CARRIAGE.—T. A. Fisher and A. F. Fisher, Beardstown, Ill.—This invention has for its object to so improve the manner of connecting the forward axle to the body of the carriage that the weight of said parts may be diminished at the same time that the strength and safety of the connection is increased.

SELF-OPENING GATE.—Sylvester J. Wright, Ellsworth, N. Y.—This invention has for its object to furnish an improved gate so constructed and arranged as to be opened by the weight of the advancing man, horse or team, and to close itself as soon as the cause of its opening has passed through.

GRAVEL WAGON.—Adam Neer, Bellefontaine, Ohio.—This invention consists in so constructing the box and frame of a wagon that the box can be run back to dump the load and again drawn forward by ropes operated by cranks and reels.

HAY AND MANURE FORKS.—Jabez K. Babcock, Shortsville, N. Y.—This invention consists in having a ferrule provided with a solid head which has holes drilled in it to receive the tines, the latter being secured in the head of the ferrule by means of keys and pins, whereby a tine in case of breakage may be readily detached and a new one inserted in its place.

CULTIVATOR.—George Sprague, Spring Hill, Kansas.—This invention relates to a new and improved construction and arrangement of a cultivator for working corn between the rows on both sides of the hill at once.

ATTACHMENT FOR ARTIFICIAL TEETH.—John C. K. Crookes, Birmingham, Mich.—This invention relates to an improvement in the construction and arrangement of an attachment for artificial teeth, whereby they are secured to the rubber base in general use, and consists in an eye attachment having flat double shanks inserted in the tooth instead of the old method with straight and headed pins.

GRIND STONE.—G. B. Markham, Wayne county, Mich.—This invention relates to an improvement in the construction of portable grind stones for family use, and consists in hanging a small stone either natural or artificial in a light metal frame to be attached with a set screw to a table or shelf and provided with a crank for turning the stone.

HORSE HAY RAKE.—J. G. Kimberlin, Dryden, N. Y.—This invention relates to new and useful improvements in steel wire toothed hay rakes, and consists in the arrangement of a lever in connection with the rake head and the draft for unloading and otherwise facilitating the working of the rake, and also in a novel mode of attaching the teeth to the rake head to secure them firmly in place without lateral movement, while they preserve their independent action vertically.

STEAM GENERATOR.—R. J. Nunn, Savannah, Ga.—This invention consists in constructing a steam boiler entirely of tubes, which are connected together in such a manner that any section of them may be removed (should a tube fail), without interfering with the operation of the boiler or the generation of steam, and also in the provision which is made for the circulation of the water by interior vertical circulation tubes.

TOOL HOLDER FOR IRON-WORKING MACHINES.—T. L. Webster, Brooklyn, N. Y.—This invention relates to a new and improved tool holder designed for slotting machines, planing machines, and all other iron or metal-working machines, the tools of which have a reciprocating movement. The invention consists in constructing the tool holder of two parts connected by a joint, and having a spring applied, all being arranged in such a manner that the tool, during its return or backward movement, will be enabled to relieve itself and pass over the surface of the work with but little friction.

MUSICAL DIAL.—N. Paterson, Columbus, Miss.—This invention relates to a dial which exhibits all musical sounds or tones, as regards their names and distances from one to the other in a circle, the various kinds of scales being distinguished by different colors. A movable dial combined with the stationary dial allows of setting the device for different key-notes.

CIRCLE PLATE OR FIFTH WHEEL FOR VEHICLES.—J. B. Stuart, Bunker Hill, Ill.—This invention relates to a new and improved circle plate or fifth wheel for vehicles, and has for its object the turning or cramping of the front axle in such a manner that the vehicle to which the invention is applied, may be turned within a smaller compass than usual.

THILL COUPLING.—Silas Rogers, Stamfordville, N. Y.—This invention relates to a new and improved means for attaching thills to axles, and has for its object the ready attaching of the thills to the axle as well as their ready detachment therefrom, and at the same time not admit of the thills becoming casually detached.

MEAT HAMMER.—A. H. Brown, Springfield, Vt.—This invention relates to a new and improved hammer for pounding meat in order to render the same tender, and it consists in having the face or faces of the hammer provided with one or more annular sharp or V-shaped edges, whereby the meat will not only be made tender, but the juices of the meat also retained in it.

CLOTHES-WASHING MACHINE.—George W. Benton, Dansville, N. Y.—This invention relates to a new and improved clothes-washing machine of that class in which a cylindrical rubber of rollers is employed in connection with a concave of rollers. The object of the invention is to obtain a washing machine of the class specified, which operate upon the clothes without wearing them or breaking the buttons, and by which the clothes are thoroughly cleansed.

SULKY RAKE.—S. A. and L. M. Kays, Independence, Iowa.—The object of this invention is to provide a rake by which the operator may ride and perform his work of raking hay. It consists in constructing two wheels which run on an axletree, to which two draw bars are attached which extend back, at the rear end of which are pendant standards, which connect with the head by means of straps.

FRYING PAN AND STEAMER.—Robert Broome, Central Falls, R. I.—The object of this invention is to prevent the flying and spattering of the fat or gravy in the process of frying meat while at the same time the steam and gases are allowed to escape, and also in combining the frying pan portion with a steamer for cooking vegetables in such a manner that the same cover which allows the gases to escape from the frying pan shall be a tight cover for the steamer.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters, must, in all cases, sign their names. We have a right to know those who seek information from us: besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruct on of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at 50 cents a line, under the head of "Business and Personal."

G. W. A., of Me.—We have never used any of the patent water-proof compositions for leather and cannot testify to their merits. We have used a mixture of resin, 1 ounce; beeswax, 6 ounces; tallow, 12 ounces with a small quantity of neatsfoot oil melted together and applied hot, with good results.

H. C., of Ark.—You cannot expect a round belt to do the work of a flat one. A one-inch flat belt is better for driving a shaft than a round belt half an inch in diameter because it will present a larger surface to the pulley than the round belt, whatever the form of the score in which it runs.

L. F. P., of N. Y., asks how he can remove the "fuzz" from woolen yarn which is to be woven in a smooth fabric; when spun it presents a bristly appearance. The method is exceedingly simple. Pass the yarn through a flame. If done properly there is no weakening of the yarn by scorching. It is largely practiced by manufacturers of smooth worsted goods, and the machine is exceedingly simple in construction and easily kept in operation.

P. C. W., of N. J.—Your plan of interposing an elastic wad between the charge and the ball in a rifle, is not original. Do you think the expansive force of the gas is partially wasted because the inertia of the ball has to be overcome before it moves? Certainly your elastic cushion will not reduce the inertia of the bullet. Your device may lessen the "kicking" or recoil, but will not add to the propelling force of the powder.

G. C. B., of Conn.—We do not think that fulminating powder will be exploded, if the pressure however great, be applied so gradually that the heat of condensation escapes as fast as it is produced.

O. G. G., of N. Y.—The Mississippi river at its mouth is further from the center of the earth than at its sources. This apparent running up hill is due to the centrifugal force of the revolution of the earth. The water tends to fly off as it does from a grind stone when in motion. . . .

The magnet and armature of the telegraphic register are soft iron. . . . The wire of the helix would not answer so well if it were large.

N. J. L., of Pa., after washing his lamp chimneys sets them up on their flanged ends to drain and dry. While they are resting thus undisturbed, they are liable to crack and he says it is a frequent occurrence that the flange part separates in a complete ring. Lamp chimneys appear to be made of poor material and to be insufficiently annealed Moreover a lamp chimney of necessity undergoes rough usage for glass. Every uneven heating and cooling is probably injurious to it.

H. D. W., of Mass.—The freezing apparatus in which ammonia is used, is quite simple in construction and operation, and is said to be successful. It is a French invention and we are not aware that it has been used in the United States.

S. H. B., of N. Y.—Mr. Ransome has employed a considerable variety in the mixture for artificial stone. The following formula will give you an idea of the nature of his process: Sand 10 parts, powdered flint 1 part, clay 1 part, alcaline solution of flint 1 part. This mixture is thoroughly kneaded in a pug mill and becomes of the consistency of putty, when it is rammed into the plaster of Paris molds. The blocks must be dried with great care. The solution of flint or liquid quartz is of the consistency of syrup and of a specific gravity of 1·6. It is made by boiling powdered flints in a strong solution of caustic soda under pressure.

J. V., of C. W.—We have not yet seen the published report of the judges at the Auburn trial of mowers and reapers.

R. C., of N. Y.—The formula for determining the elements of the hydraulic press is $$P = \frac{TC}{\frac{1}{2}D + T}$$ in which P is pressure in tons per inch; T, thickness of cylinder in inches; D, diameter of bore; C constant for strength of metal. In your case C is 7, the constant for cast iron; D, 6; T, 2. Your press should therefore be able to stand a pressure (P) of 2 4-5 tuns per square inch.

A. W. G., of Iowa.—Lithographic stone is a peculiar close grain limestone, which is imported from Germany. Zinc may be substituted for it in the lithographic process and for making experiments answer pretty well. The acids you need are acetic and nitric; in use they are diluted with water,

L. C., of Mass.—Nitrogen is much more useful than you suppose. In the air, it is mainly a dilutant and has no very interesting properties when in the uncombined state. But it as an essential element in ammonia, nitric acid, gelatine albumen fibrine, etc. In vital chemistry, nitrogen plays a very important part.

C. G. P., of Iowa.—The surface indications of petroleum are inflammable gas which has a petroleum smell, oil floating on the surface of water, and tar or asphaltum. One or more of these signs have been noticed in all districts which have been productive of oil. Yet they are not always decisive, for they exist in districts where no oil has been found.

D. J., of N. J.—If you mix two pints of hydrogen with one pint of oxygen and set fire to the mixture, the gases combine with an explosion and the product is two pints of steam, the bulk of steam being estimated for the temperature of the mixture just before the explosion. The mixed gases on combining chemically are reduced in volume one-third. But the collapsing of the gases is slow and is therefore not the cause of the explosion. At the instant of combination the gases are expanded to several times their volume, by reason of the heat of the combustion and it is this sudden expansion which is the true explanation of the explosion.

J. W., of Wis.—The mineral you send is part of a hardened deposit of fine sand. It may be used for brightening metals as a substitute for rotten stone or tripoli. A similar substance is largely used as a polishing powder.

NEW PUBLICATIONS.

MINERALOGY SIMPLIFIED. A Short Method of Determining and Classifying Minerals by means of simple chemical experiments in the dry and wet way. Translated from the last German edition of F. Von Kobell: with an Introduction to Blowpipe Analysis and other additions, by Dr. Henri Erni, Chief Chemist, Department of Agriculture. 8vo, pp. 206. Philadelphia: Henry Carey Baird, 406 Walnut street.

This book is especially valuable to mine prospectors and to amateur mineralogists; it is also a convenient reference book for skilled chemists and mineralogists. It is supplied with a copious index, which seems to comprise the names of all the important minerals found in the United States.

THE INTERIOR DECORATOR. Being the Laws of Harmonious Coloring adapted to Interior Decorations, with Observations on the Practice of House Painting. By D. H. Hay, House Painter and Decorator to the Queen, Edinburgh. From the Sixth London Editon. 8vo, pp. 207. Philadelphia: Henry Carey Baird, 406 Waluut street.

This book has more of a practical character than its title indicates; there is a great deal of useful information in it which is not to be found in any book of receipts.

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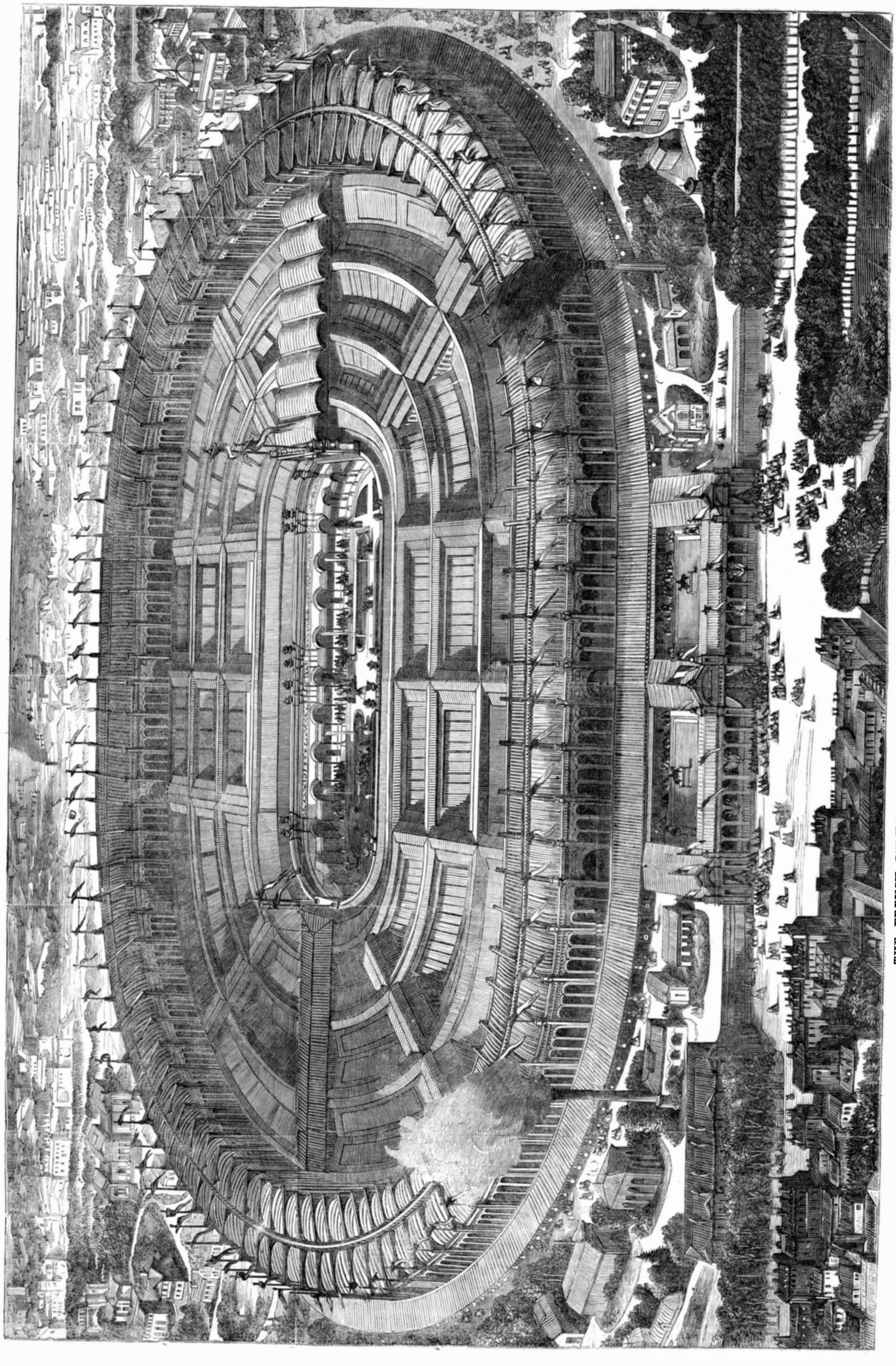

THE FRENCH INDUSTRIAL EXHIBITION BUILDING AT PARIS. [SEE PAGE 309.]

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CAUTION.

It has become necessary for us to state very distinctly that the Scientific American Patent Agency Offices are at No 37 PARK Row, and not at No 39.

LIGHTNING CONDUCTORS.

A lightning conductor is always made of metal, and of the metals which are available the choice lies between iron and copper. Iron has the advantage of less cost per pound; in all other respects copper is better. Copper is the better conductor, is easier wrought into form, and is less liable to rust. The conducting power lies in the surface; a tube is as efficient as a solid rod of the same diameter, and a strip or ribbon which presents the same amount of surface is equal in power.

The ribbon form of conductor is evidently the most economical in the amount of metal and it has beside other evident advantages. It is more compact for transportation, joints are more easily and perfectly made in it, it can be put up with less labor and more securely than a solid rod, and when erected it is less in the way and so less liable to injury. As so little metal is required in the form of a ribbon we can afford to use copper. For these reasons we prefer a copper ribbon conductor to anything else which is in use.

As to insulating the conductor from the building, the question is of little importance. Good insulation, if it were desirable, is wholly impracticable. Those who make a great ado about glass insulators, ought to try a few experiments with an ordinary electrical machine, and better understand the nature of lightning. A lightning conductor if properly constructed and put up, will furnish the most direct road for all the electricity which can get into it at its pointed end.

The most important point to be attended to in setting up a conductor is its connection with the ground. Unless a proper connection is made, the conductor is worse than useless. There are many cases on record where there was insufficient provision for the escape of the lightning and it struck the houses, doing great damage. In cities the conductor should terminate on the gas and water pipes, care being taken that the joint has as much surface as the conductor. Where there are no water or gas pipes the next best thing is to lead the conductor to a stream of water or to a well which is supplied by a spring. Ordinary cisterns are not sufficient, as the wood or cement of which they are made might not allow the electricity to pass through them fast enough. When there is no body of water near at hand the lower end of the conductor may be attached to a plate of metal of several square feet of surface or to rods or strips a few feet long, laid horizontally in the nearest moist earth.

The conductor should present the same amount of surface at all parts of its length; if any part of it be narrower, which often happens with old-fashioned rods at the joints, it is but little better than if it were at every other part of the contracted size.

If a building be in length two or three times its width it should have at least two conductors, for reasons which are sufficiently obvious. There are cases on record of churches which have been struck at the rear end while the spire was provided with an efficient conductor.

THE PUBLIC RAILWAY SYSTEM.

Evidences multiply daily, that the principle of public property in all highways and parts of highways, as advocated in and widely quoted from the SCIENTIFIC AMERICAN, commends itself to the general sentiment of the public and is to prove one of the practical and governing ideas of the age. Among others, the latest we have observed is the southern movement for a public railroad system from the coast of North Carolina, to the Mississippi river, from Atlanta to Savannah, and from the Ohio to Mobile. These three will make six schemes of the kind now pending (when formally presented) by bill, before Congress. Each of these recognises, in the manner of turnpike roads and canals, the right of every one who chooses to run his vehicle on the proposed highway, for a proper payment of tolls. This principle established as the ruling principle in the construction of future railroads will tend gradually to bring all the old roads under its operation. The same principle will ultimately prove to have been to railroads what it has been to turnpikes, the entering wedge to separate them from private ownership and make them at last free to the public, and the property of the public, on the same terms with common highways.

Another principle embodied in the North Carolina scheme, is that proposed in a memorial to Congress by Mr. Lorenzo Sherwood, establishing a uniform and moderate speed for trains, and thus enabling them to follow each other in constant and regular succession, up to the whole capacity of the line, around the circuit formed by the two tracks. There is no doubt in the minds of practical men, we believe, that the freight end of the business is the right end to begin at, postponing rapid travel to the greater question of cheap transportation, rather than, as hitherto, the reverse. Eventually, no rail will be used alternately for freight and express trains, but each description of traffic will have a track of its own, with great advantage and economy to both. The devotion of a double track to steady freight traffic, is the one thing needful to render railroad freighting as cheap and universal as it is expeditious.

NAPHTHALIZING GAS.

Illuminating gas gives the greatest quantity of light when it is just on the point of smoking, and still burns clear. Such gas is said to be rich, and the richness of gas or other hydrocarbon increases with the carbon it contains. The gas which the companies supply is very seldom of an excellent quality: if it had as much carbon as it ought to contain, it would generally give about twice as much light.

There is a very simple way of introducing more carbon into gas. Coal tar naphtha is a substance which has a very large excess of carbon; so that it cannot be burned alone without giving out an intolerable smoke. Gas has the property of taking up or dissolving a large quantity of this naphtha, and the mixture becomes thorough and is permanent at ordinary temperatures. It will be seen that the excess of carbon of the naphtha can be made to nicely balance the deficiency of the gas. Naphtha is cheap, and the amount of it needed to naphthalize a thousand feet of gas is very little. Moreover the practical difficulties in carrying on the process are by no means formidable. It is only necessary to make the gas pass over the surface of naphtha or to cause it to bubble through the naphtha, always taking care that the naphtha be so handled that it shall not set the house on fire.

The process of naphthalizing gas was first used by a Mr. Lowe in England twenty or thirty years ago. Since that time it has constantly been in use. Gas companies and insurance companies however throw cold water on it, and it has consequently never been so popular as it deserved. About six years ago a company was organized in London to carry on the process on a large scale, and succeeded in getting their naphthalizers or carburetors attached to the public lights. After a year or two, however, the company came into great disfavor and the carburetors were abandoned. What part the inefficiency of the naphthalizing company or the hostility of the gas companies had in the failure is not very clear. At all events the process must still be regarded as meritorious and practicable.

THE BROADWAY BRIDGE.

It may be hardly safe to speak of the bridge over Broadway, at the corner of Fulton street, as nearly completed, yet from appearances it is nearly so. It is partially painted, and the structure itself is not only *in situ* but built. When it will be opened for the use of the thronging crowds of pedestrians we cannot tell. The addition of the paint of light shades, so far as applied, greatly improves its appearance, but, after all, there is an appearance of heaviness, not to say clumsiness, about the structure anything but gratifying to the eye and wholly unsuited to its position and object. Public opinion is somewhat divided as to its utility and beauty; but the prevailing opinion in regard to the latter quality is that the bridge *appears* unnecessarily heavy. We must confess that we share in this opinion.

In regard to its utility there can be no dispute between those who have been compelled, several times a day, to pass down and cross Broadway during the past winter. Repeatedly, to reach Cortlandt street from the east side of Broadway, coming from Park Row, we have been obliged to walk down below Trinity Church before we could cross, and then crossed at the peril of limb if not of life. To the business portion of our people, citizens and strangers, it will be a boon, especially in the winter months. The trash published in some of our papers and made a subject of illustration in comic periodicals in regard to the reluctance of women to ascend the stairs that serve as approaches on account of the exposure to which it will subject them, is nonsensical when one considers the fashion of dress, women deliberately adopted and wore for many months, and which is not yet entirely discarded. The bridge stairs are no more provocative of other stares than tilting hoops.

The appearance of the bridge is massive rather than elegant, and yet it is not so heavy as it appears. The immense moldings of hollow castings suggest heaviness altogether out of proportion to the supports at either end. The engraving which we gave in No. 9, current volume, taken from the drawings of Messrs. Ritch & Griffiths, the designers, is of a much lighter and more elegant construction. The departure from this design is hardly creditable to those who directed and authorized it.

In such a structure as a single-span elevated foot-bridge, apparent lightness combined with the requisite strength should be the rule, and not, as in this case, adequate strength with apparent heaviness. No doubt, however, this bridge will serve its utilitarian purpose, but it can never be considered a model of beauty.

GREAT INVENTORS---THEIR SUFFERING AND SUCCESS

Once or twice in a generation it happens that a great patent, like the sewing machine, meets with a success and yields a return prompt enough to enrich the inventor himself. More usually it happens that the inventor perishes in if not of the poverty to which his self-devotion consigns him, leaving to lucky rather than worthy purchasers the lucrative product of his genius and of his sufferings. Posthumous gratitude and honor may then be his reward; but if fortunate enough on the other hand to enjoy a small percentage of the pecuniary benefit he has conferred upon his own generation alone, men too commonly think him greatly overpaid without any acknowledgement as a public benefactor, and rather make it a point to embitter his too good fortune with envy, detraction, and plenty of litigation for his rights.

In this grudge that some men feel, they wholly forget the life cost of great invention. There are a few lottery prizes in life; but most men have to pay for all they get, and inventors are not exceptions to the rule. The life of Charles Goodyear is one of the most pathetic histories under the sun, and now that the reality and wisdom of his work have redeemed it from the contempt that was long its bitterest ingredient, appears one of the most heroic and admirable.

Great power is required for great work, in men just as rigorously as in steam engines; and Charles Goodyear and Elias Howe, judged by their histories and works, have the same title to our admiration as great men, and by the same rule, as General Grant.

The last-named inventor (Howe) has a history somewhat resembling that of Goodyear, in its desperate (though less protracted) struggle, but happily contrasted with it in its sequel and reward. It is well to look back upon the price of his fortune while looking at its amount. The story is well told in the last *Atlantic Monthly* by that lively biographer, Mr. Parton, and is worth recalling in its main features here.

Elias Howe was born in 1819, the son of a Massachusetts farmer and miller, whom he assisted in both capacities from a very small beginning until the age of 16, when he went to Lowell and began life on his own account in a machine shop. At the age of 20, then a journeyman machinist in Boston, the conception of the sewing machine first presented itself to his mind, and three or four years later he applied himself in earnest to realize in a machine the plan which had been gradually wrought out in his imagination.

Here the rare faculty by which he had been ordained an inventor exhibited itself triumphantly. It is a faculty possessed by the fewest of men, where the visual image in the brain is so true to reality as to require only an embodiment to work successfully in the very form foreshown. Within five months, commencing in December, 1844, the sewing machine was an accomplished fact, made two suits of clothes, sewing at the rate of 250 stitches a minute, and was patented. That first machine is still preserved in the Howe Company's Office on Broadway, and doubtless will be preserved to all time as one of the most interesting mementos connected with material progress. It is said to have recently proved its capacity, making 300 stitches a minute, and making them as well as any of its successors; a fact among the most remarkable, even if a little exaggerated, in the annals of invention.

Singularly indeed, the trials of the inventor were but commenced with the completion of his machine. Nine long and distressful years were consumed in unavailing efforts to start the manufacture and sale, before the business began to yield a modest support to his family. At the end of the first two years not a machine had been sold. Two years more were spent in extreme poverty and trial in England, during which time his straits sometimes bordered on starvation. Against the opposition and through the difficulties which he encountered, few men would ever have persevered, or persevering would have succeeded. The present generation owes as much to the invincible determination of the patentee as to the ingenuity of the inventor. Great as his success has at last been, it is one of those prizes which are only for the wise and valiant who "endure unto the end."

OFF TO EUROPE.

On Saturday, May 4th, Mr. S. H. WALES, one of the proprietors and editors of the SCIENTIFIC AMERICAN, with his family, sailed on the steamer *Pereire* for France. A large number of his friends were on the wharf to take their last farewells, and wish him and his family a pleasant voyage and safe return. Mr. Wales intends to visit all the principal points of interest on the continent and in Great Britain. He will spend considerable time in Paris during the holding of the Exposition, and our readers may hear from him occasionally through the columns of this paper.

A SCIENTIFIC party from New Haven, Conn., under the command of Clarence King, a graduate of the Yale Scientific School, has just set out on an exploring tour of the 40th parallel of this continent.

THE PACIFIC RAILROAD----ITS SEVERAL GRAND DIVISIONS.

THE CENTRAL PACIFIC RAILROAD OF CALIFORNIA.—The Pacific Railroad is to owe its anticipated early completion (1870) to three causes: the unequaled material intensity of California life and enterprise; the opportune interposition of the cheap Chinese labor; and the judicious subsidy of the national government, which allows each company—that building from the west and that building from the east—all the road it can build, with the loan of national bonds to the amount of $16,000 a mile for the same. The Californians (Central Pacific Railroad Company of California) have shown their mettle in this competition, and have driven their end of the road forward with an energy that has accomplished wonders. The whole mountain ascent and descent is now nearly graded, and most of the heaviest portion completed and running. The chief difficulties of the undertaking had to be encountered on that part of the line. The dreaded barrier of the Sierras, of impassable altitude and obstructed with impassable snows in their season, was met in the first one hundred miles. Before bold determination and able engineering these difficulties have dwindled so that, considering relative prices of all things, the road has not proved after all so much "steeper" in cost or grade than some others built long before, and the expected impassable snows have proved sufficient to make only three days interruption of trains in a whole winter as severe as the last. The estimated cost of the ninety-four miles in operation since last fall, with the remaining eleven miles to the summit, was above that of any road heretofore built, having been fixed at $88,400 per mile, against about $80,000 for the Hudson River and New York and Erie, and $81,273 for the Boston and Providence. Nearly $15,000,000 have been expended on the above 94 miles with about one third of the work on the next 25 miles and a liberal equipment of rolling stock. When 150 miles are completed, which is expected in July next, the costly work will be done, and the total construction cost will be, it is now supposed, about $15,000,000, or $100,000 per mile. There will then remain 575 miles to Salt Lake City, which it is supposed will be built for $60,000 per mile, and in one fourth the proportional time of building the mountain section. One hundred miles of this are promised us by the end of 1867, making 250 in all.

The average ascent on the California side is 75 feet to the mile: the heaviest grades completed being 105 feet. Of the grades of the 11 miles remaining we have no particulars. The time now occupied by trains is six hours: thus running nearly sixteen miles an hour. Fourteen tunnels have been made or are making, to secure the easiest possible grades, the longest of which, piercing the crest of the summit, is 1,658 feet in length, and lacks 500 feet of being completed, but is going forward with a large force of hands, working night and day. Protection from snow slides has to be provided in some places by sheds adapted to shoot the snow slides across and clear of the track. Two miles of these sheds will be required. The highest elevation is 7,042 feet above the sea level, or three times as high as railroads have ever before been constructed on this continent. Large working parties have been em ployed at the summit all winter: which reads singularly when we think of the exploring party under Fremont, that perished almost entirely in the attempt to pass the snows of the Sierras a few years ago. The earnings of the road are already nearly $10,000 a mile per annum, in its fragmentary condition; and even without natural growth and the addition of through traffic, would yield at the same rate a handsome profit for the whole capital to be invested.

THE UNION PACIFIC RAILROAD COMPANY is not disparaged by comparison with its western rival. It agreed to finish 250 miles the current year. It has already so far made good the promise that its fulfillment is morally certain, and we may look, therefore, by the end of 1867, for 600 miles of railroad in operation from St. Louis toward the Rocky Mountains. This will reach the border of Colorado, leaving but 750 miles between the two lines, which will be finished under the spur of competition and urgent demand, in less, if anything, than the two years appropriated to the task. When this is done, the year will be one of the most memorable turning points in the material progress of mankind, and a more remarkable starting point than any before it in the advancement of the United States in population and resources, which will then pour into our territory in redoubled ratio from all parts of the world, to be again redoubled every year by the development of the virgin treasures of the continent.

THE SOUTHERN LINE.—The "South-west Pacific," from St. Louis to the state line in the south-west (capital $8,000,000), and the "Atlantic and Pacific," from the latter point to the Pacific Ocean via Albuquerque (capital $100.000,000), are said to be virtually united in one mammoth corporation, possessing grants amounting to 56,036,000 acres of public lands, and 126 miles of the former road, reaching from St. Louis to Gasconade River, completed. Their line is represented to be shorter and easier than the Central, and offers to the public the advantages of crossing the projected North and South road from Leavenworth to Galveston, the Little Rock and Memphis road, and the Arkansas and Colorado Rivers at the head of navigation in each. The Southwest Pacific was forfeited to the State of Missouri after 113 miles had been built from St. Louis to Rolla, and sold by the State last year to General Fremont, who has conveyed it to the present company. The Southwest Pacific company has pushed on its work with energy, having already completed 13 miles and contracted 54 more, of which at least twenty will be opened by August next. This embraces the most difficult part of the work. The distance to the state line, constituting what is to be the Missouri Division of the Atlantic and Pacific, is 317 miles. The line then passes due west, through the Indian Territory, New Mexico and Arizona to California. Work can be can be commenced in both directions at two points on the line—using the navigation of the Colorado and Arkansas Rivers—as well as at each extremity, making six leading points of departure reached by existing routes of steam carriage. A San Diego letter states that ground will soon be broken at that port, as the Pacific terminus of the road. This makes a short and direct line across the southern end of California, and will make a second Pacific metropolis of San Diego.

Science Familiarly Illustrated.

What is Gold Thread?

Gold in the minutest particles is used for ornamental purposes in the form of plating, leaf, wash, etc., but one of its most delicate applications is that of a fine thread either woven into a fabric of silk, used for embroideries, twisted into fringe or netted into lace. In none of these forms, however is the thread a filament or wire of solid gold; the thread is gilded and consists of two metals and a core of silk. Wire for gold thread is of silver with a coating of gold so infinitessimally thin as to be beyond our comprehension. A rod of silver is coated with gold to a thickness of about one-hundredth part of that of the silver, and then this silver gilt wire is drawn down to a wire much finer than the finest human hair, and yet it will be then perfectly coated with the gold, still maintaining its relative thickness of one hundredth part, one-tenth the thickness of fine gold leaf.

This gilded wire is then passed between highly polished and hardened steel rollers and flattened, preparatory to being spun upon the silk thread. In this form of a film-like ribbon it is so light that a handful of it tossed into the air will float in the atmosphere of a room like gossamer. This flattened wire—if its diminutiveness deserves the name—is spun around a thread of silk, covering it in a spiral coil, so closely laid that it appears like a solid gold thread, while in fact the gold is as nothing compared to the other material. This thread is so delicate, although of triple composition, that it can be easily threaded in a fine needle and used for embroidering purposes. It can be woven into silk or into gold lace, or spun and twisted into cord, bullion, and fringe. The lace that decorates the uniforms of our soldiers, the bullion fringe of their epaulettes, which has such a massively rich appearance, is but this fine hair-like thread of silk, silver, and gold.

But the larger part of our gold lace and other ornamental gilt material is base, having not a particle of gold in its composition. That which represents gold is merely one of the compositions having copper for a base, ductile and tenacious, and worked in the same manner as in the true gold thread. This wire, however, has no silver core, nor is it usually spun upon silk but on orange colored cotton. This is largely manufactured in this country, and when just from the workman's hand is very rich in appearance, but soon tarnishes, and, if exposed to moisture, turns green from oxidation, which quickly rots the cotton core.

Gold thread and its manufactures are costly, not so much for the material employed as for the skill and care necessary in its production. It is wonderfully strong when properly made, and if protected from moisture the lace and embroidery will retain their luster for years.

NOVEL PLAN FOR A BRIDGE.—A French engineer named Boutet proposes to bridge the English Channel (20½ miles) with a structure on the suspension plan aided by the buoyant power of water. His foundation would be in effect a submerged wire suspension bridge, a fabric of sixty 7-inch wire cables, crossed and laced together by smaller cables, all carefully galvanized, and the whole thickly coated with guttapercha and supported at intervals by immense iron buoys. Upon this foundation would rise 65 iron structures of great breadth of base and 600 to 900 feet high, as supports at proper intervals for the bridge road, formed of a network of great wire cables, like the foundation. It would be a double suspension bridge on a monstrous scale, with the sixty-five cable towers acting as trusses between the upper and lower stringers, and with the peculiarity of resting the lower portion in the depths of the channel on buoyant supports. The cost is estimated at some $75,000,000.

THE NAVAL RAM.—According to the opinion of some engineers, the best naval gun, and the one destined in future to do the most terrible execution and decide the fate of combats, is a steam ship: the best shot for naval purposes is ditto: the best gunpowder is coal, or perhaps petroleum or some other giant progeny of carbon and hydrogen, acting through the expansion of water or directly through its own, to hurl the sharp-beaked and enormous weapon into the ribs of the foe. Nothing less than mountains of iron—thunder mountains or *Dunderbergs*—are to be considered fit ammunition for modern Titans to launch at each other across the oceans that divide them.

THE LONDON UNDERGROUND RAILWAY.—During the four years since the opening of this line 58,214,075 passengers have been carried, and the amount of fares received exceeded $2,850,000. The largest number of passengers ever carried was during Whitsun week of last year, when 505,524 persons were transported in safety over the road. Strange to say there has never been a single fatal, and but one minor accident on the road since it was opened to the public.

IT IS STATED that altheugh more than three months have elapsed since the explosion of the Oaks Colliery in England, little progress has as yet been made in extinguishing the body of fire raging at the bottom. All the shafts have been sealed up.

ISSUED FROM THE U. S. PATENT OFFICE
FOR THE WEEK ENDING APRIL 30, 1867.
Reported Officially for the Scientific American

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On filing application for Design (three and a half years)	$10
On filing application for Design (seven years)	$15
On filing application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & Co., Publishers of the SCIENTIFIC AMERICAN, New York.

64,185.—RAILROAD SWITCH.—Joseph B. Alexander (assignor to himself and Wm. H. Frear), Washington, D. C.

I claim the construction and arrangement of the switch rails, C G and C' G', with the arms or the wings of a plate of iron or wood turning on a central fulcrum in such a manner as to oscillate and open one track while it closes the other, as described and for the purpose set forth.

I also claim the anchor-shaped cam, K, with the wings, L and L', and the friction roller, M, as described and for the purpose set forth.

I also claim, in combination with the above, depressing rails E and E', so constructed and arranged as to be operated upon by the shifting roller or wheel, c, attached to the locomotive engine, as described and for the purpose set forth.

64,186.—CARRIAGE CURTAIN FIXTURE.—A. C. Babcock and John Duffy, New Haven, Conn.

First, We claim the plate, E, in combination with a spring, F, when constructed and arranged so that the said spring bears upon the surface of the plate, E, as and for the purpose specified.

Second, The spring, F, attached to the stud, D, and so as to form the handle, G, substantially as and for the purpose specified.

Third, In combination with D, plate, and spring, F, we claim the stop, d, in the manner specified.

64,187.—MACHINE FOR MAKING WATER, GAS, AND OTHER PIPES.—Geo. H. Bailey, Jersey City, N. J.

First, I claim the employment, in the manufacture of pipes composed in whole or in part of cement or plastic material, of a plunger either movable or stationary, which is shaped substantially as set forth, either with or without spiral cutters, and which, by the application of power or by its own weight and momentum, displaces the cement in front of it, causing the latter to adhere to the pipe, and rendering it solid and compact, substantially as described.

Second, The combination with the plunger, D, of the top and bottom collars, C C', with vent holes for the admission and escape of air, substantially as described.

Third, The application of lifting rods, g g, to the collar, C, for lifting this collar when the plunger is raised, substantially as described.

Fourth, I claim a plunger working within a metallic pipe or mold having one or both ends closed, so as to more perfectly and forcibly compact the cement or plastic material within it, substantially as described.

64,188.—MODE OF LIGHTING GAS.—Arthur Barbarin, New Orleans, La.

First, I claim the direct use and application of spongy or finely divided platinum (without extra pipe for conveying the hydrogen gas upon the same) to an ordinary gas burner in any manner that shall cause the platinum to be directly in the path of hydrogen or hydro-carbon gas, when issuing through such ordinary burner, whether these gases be separate from each other or mixed together, whether the burners have additional jets or not, and whether the platinum be used and applied permanently or temporarily to said burners, for the purpose set forth.

Second, The lighting of hydrogen or hydro-carbon gas, whether separate or mixed, by means of spongy or finely divided platinum placed on a gas burner as herein specified, whether the said platinum be temporarily or permanently attached to the burner, or whether it be temporarily applied in any other way to hydrogen or hydro-carbon gases, either separate or in a mixed state, when issuing from a burner.

Third, The use of the same pipes and branches, as herein described, for the purpose of conveying the gases, whether they are mixed or separate, to the burners, for the purpose set forth.

Fourth, Conveying the gases, in a separate or mixed state, or one before the other, through the same pipe and branches as described, for the purpose set forth.

64,189.—COMPOUND FOR CLEANSING THE HUMAN BODY FROM OFFENSIVE ODORS.—Henry D. Bird, Petersburg, Va.

I claim a compound for cleaning the surface of the human body, substantially as herein set forth.

64,190.—GATE.—Daniel Bordner, Canton, Ohio.

I claim the peculiar arrangement of the levers, K and L, in shaft, S, acting on the bar N, through the iron, M, the said bar, N, having the cord, I, attached to it and to the end, W, of the upper bar, A, of the gate, the several parts operating in the manner and for the purpose specified.

64,191.—GRATE BAR.—Henry L. Budd, New York City.

I claim a furnace grate bar formed of a series of sections, b, attached to the longitudinal bar, a, said sections interlocking, and being constructed substantially as specified.

64,192.—WELL PIPE.—James Budd, Pittsford, N. Y., assignor to Budd & Briggs.

I claim the combination and arrangement of tubes, f o, the flanged collar, n, and flanged point, a, the whole substantially as and for the purpose set forth.

64,193.—GATE.—James Budd, Pittsford, N. Y., assignor to Budd & Briggs.

I claim the combination of the double action lever, a, with the levers, b double action levers, d d, horizontal bar, c, strips, e e e e and f f, guiding boards, i and h, also posts, m m, with arms, r r, the whole operating substantially in the manner described and for the purpose set forth.

64,194.—GAS CONDENSER, SCRUBBER, AND WASHER.—Thos. B. Burtis, Chicago, Ill.

First, I claim the lengthy and narrow boxes, D, the water vessels, D2, above the same, and the water spaces, E, between the same, substantially as and for the purposes set forth.

Second, The method of applying the water to condense, scrub, and wash the gas, substantially as set forth.

Third, The combination of the vessels, D2, the overflow pipes, k, water pipe, K, service pipes, l, and water chambers, M, as and for the purposes set forth.

Fourth, The application of the jet chamber, M, as and for the purposes set forth.

Fifth, The application of obstruction pieces extending from top to bottom of the boxes, D, substantially as and for the purposes set forth.

Sixth, The arrangement and combination of the pipes, F and G, f and g, with their stop cocks, valves and the boxes, d d1 d3 and d7, as and for the purposes set forth.

64,195.—BRUSH BLOCK.—Wm. B. Burtnett, New York City.

I claim a whitewash brush block which is constructed with a strip of wood which is harder than the wood of which the block is made, inserted into a kerf in its lower edge, so that the grain of the strip shall run at right angles to the grain of the block, as herein described and shown, thereby producing a new and improved article of manufacture.

64,196.—MANUFACTURE OF PORCELAIN.—Waldron J. Cheyney, Wallingford, Pa. Antedated March 29, 1867.

First, I claim the use of the minerals known as cryolite and chiolite, or their equivalents, in combination with silica, for the purpose of producing a vitreous porcelain, substantially as described.

Second, The fusing of either of the before-named minerals or fluellite or their equivalents with silica, in combination with soda, potash, lime, or other alkali or oxide, substantially as described.

Third, A new article of manufacture made by fusing silica with the above-named minerals or their equivalents, which I call "Hot-cast Porcelain."

64,197.—MACHINE FOR PUNCHING PAPER.—Spencer M. Clark, Washington, D. C., assignor to John Q. Laman.

First, I claim the combination with the punches and surrounding clamps and the springs of the screw bolts and rods, for adjusting the tension of said springs, and for effecting the combined movement of the clamp and punches, substantially in the manner herein specified.

Second, The combination with the clamp and connecting screw rods or bolts of the sliding cross head, punches, and surrounding springs, under the arrangement and for operation as herein set forth and described.

64,198.—STOP COCK.—Z. Erastus Coffin, Boston, Mass.

I claim the taper valve operated by connected screws and moving on continuous guides, arranged within the shell or body or a stop cock, substantially as described.

64,199.—VALVE FOR STOP COCKS.—Z. Erastus Coffin, Boston, Mass.

First, I claim the valve made in two parts, each bearing a face and so jointed with reference to each other and to the mover as to render them self-adjusting to the angles of the seats, sub tantially as described.

Second, Giving the mover a movement independent of the movement of the va ve, so as to relieve the pressure, by means substantially as described.

64,200.—TYPE-SETTING MACHINE.—A. Corey and J. M. Harper, Philadelphia, Pa.

First, We claim the loose wheel, d, or its eqivalent, so arranged as to bear on the type as it is being pushed from beneath the reservoir.

Second, The reciprocating bar, I, so constructed at the end and so combined with the arresting and guiding plate, J, as to turn the type in the ma ner described.

Third, The combination of the said guiding plate, J, the pushing bar and the shoulder, j, on the latter.

Fourth, The combination with the pushing bar of a plate, j2, with a straight edge, x, so arranged and operating as to adjust the row of type in line.

Fifth, The setting of a vertical row of type by introducing type after type to the said row, substantially in the manner described.

Sixth, Beneath the vertical row of type a block or plate, T, or its equivalent, so rounded or otherwise formed that on pushing a type to its place beneath the row it will be the means of elevating the same, as described.

Seventh, the plate, g, arranged as shown, so that the row of set type will not be disturbed by the introduction of a new type to the row.

Eighth, The pressure plate, w, arranged in respect to the plate, g, for the steadying of the vertical row of the type, substantially as described.

Ninth, The combination substantially as described of the plates, N and g, and rods, S and S', for confining and guiding the vertical row of type.

Tenth, The bar, g, so connected to the machine and to a suitable operating device that it can be moved at pleasure away from the front edge of the row of the type when the same has to be inspected.

Eleventh, The combination of the plate, N, the rods, S and S', and the mechanism herein described, or the equivalent to the same, whereby the rods are caused to recede from each other and make way for the row of type prior to the same being pushed back by the said plate, N.

Twelfth, The box or case, M, in combination with the detachable type receiver, 5.

Thirteenth, The mechanism described or its equivalent, for causing the block, Y', to recede prior to a new row being pushed toward a previously formed one.

Fourteenth, The combination of the pressure plate, Z, with the type-receiving c se, and sliding block, Y'.

Fifteenth, The spring plate, F, fig. 2, arranged and operating for controlling the whole of the keys, substantially in the manner described.

64,201.—WHEELWRIGHTS' MACHINE.—C. W. Corr, Cartinville, Ill.

First. I claim the adjustable frames, O and B, and the shaft, M, with the hinged support, E, when the said several parts are arranged to operate as and for the purposes set forth.

Second, the hammer. D, arranged to be operated by the spring, f, and lever, I, together with the means of regulating the force of its blow at will, as shown and described.

Third, The combined sawing and tenoning tool constructed substantially as described.

Fourth, The frames, J and K, arranged to move in the arc of a circle, the center of which shall be coincident with the center of the shaft supporting the hub, for the purpose of adjusting the sawing and tenoning tool, to work on a wheel having any number of spokes, as herein described.

Fifth, I claim so mounting the tool, o', that it shall have a lateral movement for sawing off the end of the spoke, and also a longitudinal movement for forming the tenon on the spoke, substantially as set forth.

Sixth, The tool, P, for supporting and holding the spoke while being driven as described.

64,202.—RIVET MACHINE.—J. E. Crisp, Charlestown, Mass.

First, I claim the combination of the intermittently revolving die disk, G, with the plungers, J and K, arranged and operating as described.

Second, In combination with the subject matter of the first claim, I claim the plunger, P.

Third, In combination with the plungers, J and K, I claim the series of cams on the face of the wheel, L, and the hammer, m.

Fourth, In combination with the intermittent revolving die disk, G, I claim the plungers, J and K and P, and the stubs on the periphery of the wheel, L.

64,203.—CALIPERS.—James Henry Culver, San Francisco, Cal., assignor to himself and Cornelius Leonard.

I claim a pair of calipers either for inside or outside measuring, constructed with the joint, C, and shoulder, b and c, substantially as and for the purpose set forth.

64,204. — MECHANICAL TELEGRAPH. — Jonathan Dearborn, Seabrook, N. H.

I claim the combination and arrangement of the six bell cranks, and the three connecting rods with the two shafts, and also with the two telegraphic endless chains and their sprocket wheels, applied together and constructed substantially in manner and so as to operate as specified.

I also claim th e combination and arrangement of the two serrated racks, H I, connected by a chain going around a pulley as described, with the sprocket wheel, K, the connecting rods, o o, and bell cranks, m n, applied to a rotary shaft, as set forth.

64,205.—SHOES.—William A. Deitz, Albany, N. Y.

I claim the method of constructing boots by making the opening for the introduction of the foot in the back, and covering the opening with a tongue on the inside, with a flap extending around the side of the boot, secured to the same in the manner and for the purposes set forth.

64,206.—MACHINE FOR HUSKING CORN.—D. A. Dickinson, Baltimore, Md.

I claim the arrangement of the shafts, having pulleys placed eccentrically, and belts, substantially as and for the purpose herein recited.

And in combination with the pulleys, or their equivalents, I claim the teeth, g, for the purpose herein set forth.

64,207.—CLOG FOR PREVENTING COWS FROM FRISKING THE TAIL WHILE BEING MILKED.—Noah Dutton, Janesville, Wis.

I claim the application of a weight, or an instrument of specific gravity, to a cow's tail while milking her, substantially as described and for the purpose specified.

Also, the wing, b, in combination with the said instrument or weight, substantially as described and for the purpose specified.

64,208.—CLOTH-FOLDING MACHINE.—J. D. Elliot, Grafton, Mass.

What I claim, is dividing the table and hinging the parts at or near the center, so as to operate substantially as and for the purpose specified.

64,209.—LET-OFF AND TENSION FOR YARN, THREAD, etc.—Alfred B. Ely, Newton, Mass.

First, I claim the bar D, lever, D G H or D I H, and spring, J, combined and operating substantially as described.

Second, Regulating the giving-off of the yarn by means of lever, N O, and spring, Q, operating against the lugs of a revolving wheel, substantially in the manner described.

Third, The combination of the spring, x, with the end of the presser foot, H, on the arm, N, to receive the blow of the lug, substantially as and for the purpose described.

Fourth, Applying and regulating the tension upon the yarn by means of the adjustable elastic pressure roll, operating substantially as described.

64,210.—CHURN.—George W. Emerson, Peru, Ill.

First, I claim the churn body, constructed as described, in combination with the shaft, T, shown in figs. 1 and 2, with the frame, fig. 1, and the rack, A B, fig. 3, substantially as specified.

Second, The flutter wheels, A' B' C' and D', fig. 2, one or more, to be used in a churn, substantially as described.

Third, The combination of the blocks or bars, H I' J K, fig. 2, one or more, with the flutter wheels, one or more, to be used in a churn, substantially as described.

Fourth, The movable frame, fig. 2, composed of the strips of metal, L M' N' O P Q R, connecting bars or rods, H I' J K, or equivalent, to be used in a churn, substantially as described.

64,211.—PESSARY.—David Ewing, Indianapolis, Ind.

First, I claim the curving arms, c c c c, when constructed and combined with the rim, substantially as set forth.

Second, The hollow stem, e e, when the same is combined with the adjustable springs, g g, in manner and form as aforesaid.

Third, The adjustable springs, g g, when the same are constructed and adjusted, substantially as set forth, and combined with the said hollow stem, e e.

Fourth, The improved pessary described herein, when the same is considered as a whole device, and constructed in its several parts, as aforesaid, and used in the manner and for the purpose hereinbefore described.

64,212.—FIRE LADDER.—George Kale Foster, San Francisco, Cal.

First, I claim the segmental racks, F G, and pinions, T T, operated by the gear, h g, and hand wheel, c, substantially as described and for the purpose set forth.

Second, I also claim, in combination with the ladder, the swivel-joint rings, r r r, on the ends of the rulcrum rods, to support and carry up the hose when the ladder is raised for use.

64,213.—PLOW.—George Gibbs, Canton, Ohio.

I claim the lever, a, rod, b, joint, c, and slot, d, constructed, arranged, and operating in the manner and for the purpose set forth.

64,214.—HARNESS SADDLE.—Algernon Gilliam (assignor to himself and F. and H. Diehl), Cincinnati, Ohio.

I claim the arrangement of recurved and overlapping metallic cantle, H, and lug, C, or devices substantially equivalent, enabling the fastening the rear portions of the seat, seat cover, and tree securely together by the agency of a single screw, as and for the purposes set forth.

64,215.—HARNESS PAD.—Algernon Gilliam (assignor to himself and F. and H. Diehl), Cincinnati, Ohio.

First, I claim a harness-pad plate or tree, of malleable iron or other metal, with an upper flange, B, and lower plane or flat surface, with holes, C, as and for the purpose stated.

Second, I claim as a new article of manufacture a harness pad with a tree, consisting of the elements, A B C, in combination with the pieces, D E F, substantially as described.

64,216.—MEANS FOR OPERATING THE TREADLES AND HARNESS SHAFTS OF LOOMS.—Oliver W. Gorgon, Mount Pleasant, Iowa.

First, I claim the combination of the harness frames C, and their supporting ends, with the hinged treadles a, the tappet shaft B, and adjustable tappets B', the whole constructed and arranged to operate substantially as and for the purpose set forth.

Second, The combination of the hinged treadles A, actuated positively both in ascending and decending by the adjustable tappets B,' projecting from the tappet shaft B, with the harness frame C, and the end guides E, substantially as described.

64,217.—SEED SOWER.—Silas Grenell, Mokena, Ill.

First, I claim the combination of trough D, spreading beard O O, shaft I, having arms S, and cups J, and hopper P, when arranged to operate substantially as described.

Second, The ends E, having the loops H, in combination with the arms G, and rod I, as described and for the purpose set forth.

64,218.—POTATO DIGGER.—D. B. Hart, Mentor, Ohio.

First, I claim the digger ploughshare E, provided with open spaces or perforations, as and for the purpose set forth.

Second, The screen mold board M, provided with adjustable screen rods, as and for the purpose specified.

Third, The auxiliary screen P, in combination with the digger ploughshare E, and screen mold board M, supported and vibrated by means of the combined arrangement of parts specified, viz: the graduated bell-crank lever S, standard S, link T, standard R, connecting rod T', crank pinion wheel T2, spur wheel T3, adjustable driver wheel U, slotted strap U', swing rods, R and Q, pivoted hanging Q, beam A, and landside D, all operating as and for the purpose specified.

Fourth, The rotary stalk cutter H, and standard H', slot ', and set screw J, in combination with the clearing rods K, and K', and beam A, as and for the purpose set forth.

Fifth, The use of the chain W, in combination with the truck, as represented, and the employment of the guide wheel V, both operating as and for the purpose specified.

64,219.—ATTACHING THILLS TO CARRIAGES.—William H. Hartman and A. K. M. Pickert, Fostoria, Ohio.

First, I claim the rubber block E, provided with the guard F, and secured by means of through bolt or screw G, to the detached or separate clip bar H, in combination with the slotted stay D, secured to clip I, in the manner shown and described.

Second, The head B, pivots C, and slotted stay D, in combination with the clip I, guard F, screw G, and rubber E, when the several parts are constructed and arranged in relation to each other, in the manner and for the purpose described.

64,220.—KILNS FOR DRYING AND CURING HOPS.—William Macey Haynie, Sacramento, Cal.

I claim a hop kiln constructed with boxes, having the slides F F, or their equivalents substantially as and for the purpose described.

64,221.—QUARTZ MILLS.—James Hitchens, Nevada City, Cal.

I claim an ore pulverizer, consisting of the containing cylinder A, and the supporting plate B, constructed and operating substantially as and for the purpose herein described.

64,222.—HARNESS HAMES.—John Holt and Simon G. Cheever, Chelsea, Boston, Mass.

We claim the projecting angular arrangement of the hold back strap attachment, substantially as described.

Also the combination in one integral piece of the breast strap and trace attachment for harness hames, substantially as described.

64,223.—DIE FOR BRICK AND TILE MACHINES.—James Hotchkiss and Ezra Buss, Springfield, Ohio.

We claim the employment of friction rollers either adjustable or not, applied to the dies of brick and tile machines, for the purposes herein specified.

We also claim the contraction of the die to the mouth thereof, in combination with friction rollers on the die substantially as and for the purpose herein set forth.

We also claim the mitred or beveled edges of the rollers, for the purposes herein specified.

We also claim the convexly curved or bulging form of the rollers for the purpose herein set forth.

We also claim scrapers I I, in combination with the rollers, substantially as and for the purpose herein specified.

64,224.—CAR STARTING APPARATUS.—Jarvis W. Houghtelin, Detroit, Mich.

I claim the double levers B B, pivoted on the axle near the wheels connected by the bar M, provided with the bent rod H, and pawls F F, operated from the draw bar D. all as described and for the purpose set forth.

Second, In combination with the above, I claim the lifting lever C, foot piece K, and connections as described and for the purpose specified.

64,225.—WAGON BRAKE.—Samuel E. Hyndman, Middletown, Ohio.

I claim the brake levers f f, rods e e, in combination with the slide braces d d, hounds c c. and tongue i, sliding bolt h, and lock bolt s, when the parts are constructed, arranged and operated in the manner and for the purpose specified.

64,226.—THILL COUPLING.—James W. Innis, Salem, Ind.

I claim the thill coupling consisting of the clip A, and pin receiving projection a', cast therewith through the side of which passes the tightening screw F, pressing into the cavity in the pin D, and operating substantially as described for the purposes specified.

64,227.—CUTTER GUIDE FOR MOLDING MACHINE.—Dedrick Jordan, Charlestown, Mass.

I claim the combination of the cutter guide a, constructed with the flange b, the cylinder e, and the adjustable and retaining nuts c d, as and for the purpose specified.

64,228.—CUTTING OUT LEATHER.—Arza B, Keith, North Bridgewater, Mass., and T. K. Reed, East Bridgewater, Mass.

We claim the described process of press cutting with handle dies substantially as described.

Also the combination with a treadle lever, of a stop lever and a friction coupling, arranged to operate substantially as described.

64,229.—CHIMNEY JACK.—John Kingsborough, Cleveland, Ohio.

I claim the slides B, adjustable hinge deflectors C, and guards D, in combination with the channel or chamber I, and case J, arranged in the manner and for the purpose set forth.

64,230.—CURTAIN TASSEL.—W. Irving Laighton, Portsmouth, N. H.

I claim the combination of the cap or cover a a, with slide b, to be attached to the barrel of the tassel, for the securing of the cord, e, after putting it through the tassel as described, for the purpose aforesaid.

64,231.—SKIRT HOOP.—John B. Lattin, (assignor to himself E. Wooster & Company, and F. Hull & Company,) Birmingham, Conn.

I claim the bottom hoop for hoop skirts formed by combining two or more springs in a single cover, the upper edge of which is formed as described, so as to be stitched to the tape of a skirt, as and for the purpose set forth.

64,232.—BURNING FLUID.—James T. Leete, New York, N. Y.

I claim a new compound for a burning fluid having as its base benzine or naptha, fully charged with carbonic acid, so as to neutralize and partially destroy its inflammability and the admixture thereafter of the several ingredients in the proportions named as substantially set forth.

64,233.—PREPARING FUEL FROM COAL DUST AND FRESH WATER PEAT.—Heman S. Lucas, Chester, Mass.

I claim the application of common salt either dry or in natural or artificial solutions in the preparation of fuel from fresh water peat and fine coal, in the manner and for the purposes set forth.

64,234.—EXPANDING MANDREL.—James B. Mallalieu, Chicago, Ill.

I claim the combination of the mandrel A, with the movable bush or jacket B, without a collar as and for the purposes set forth.

64,235.—LET-OFF AND TAKE-UP MECHANISM FOR LOOMS.—Jeremiah A. Marden, Newburyport, Mass., assignor by mesne assignments to A. B. Ely, Newton Mass.

First, I claim the combination of the rock shaft C, with its arm E, and the spring rod F, provided with the adjustable nut f, when constructed and arranged as and for the purpose described.

Second, I claim the combination of the adjustable spring rod F, and the dog G, with the pawl H, and escapement wheel I, substantially as and for the purpose specified.

Third, I claim a let-off motion in looms effected by the tension of the yarn upon a rocker shaft C, provided with an arm E, in combination with a spring rod F, a pawl H, escapement wheel I, and the yarn beam B, with its intermediate connections as set forth.

Fourth, In combination with the above described devices for effecting the let-off motion, I claim a take-up motion effected by means of a pawl O, attached to the lay in combination with the toothed wheel P, attached to the cloth beam, and one or more pawls attached to the frame, substantially as and for the purpose specified.

Fifth, The relieving pawl H, operated by the tension of the yarn upon the rock shaft through the medium of the adjustable spring rod F, substantially as described.

Sixth, I claim the spring rod F, when made with a screw thread, in combination with the nut f, rock shaft C E, and relieving pawl H, substantially as set forth.

64,236.—DOOR FOR RAILWAY CARS.—B. Martin, Prairie du Chien, Wis.

I claim as an improvement in railroad cars for carrying grain in bulk, the combination of the trapeze shaped door C, inclined cleats B, checks D, cleats H, recesses I, pins E, notched shoes F, and bolts G, all constructed and arranged to operate as and for the purposes specified.

64,237.—TUCKING AND PLAITING ATTACHMENT FOR SEWING MACHINES.—Charles Z. Mattison, Buffalo, N. Y.

First, I claim the spring bar A, attached to the rocker of a sewing machine and operating as and for the purposes and substantially as described.

Second, The adjustable sliding rule D, in combination with the spring bar A, attached to the rocker the same lapping over said spring bar the width of the desired hem, fold or tuck, and operating in the manner and substantially as set forth.

64,238.—CHURN DASHER.—Shannon McGuffin, Rising Sun, Ind.

I claim the combined inverted funnels and butter gatherer heretofore referred to.

64,239.—GATE.—E. R. McKinney, Lacon, Ill.

I claim the arrangement and combination of the cross bar B, near the top of hinge post with its pendants C C, and r r connecting with the lever L, on the top bar of the gate, also device of lever L, with rods t t, connecting with latch as hereing described.

64,240.—DIVIDERS AND CALIPERS.—G. L. McKnight, Worcester, Mass.

First. I claim the combination with the arms of calipers or dividers of the screw C, slotted nut D, and tightening nut F.

Second, The combination with the curved ends E E, and arms A, of the slotted nut D, and tightening nut F, substantially as and for the purpose set forth.

Third, The combination with arms A, having shoulders 1,1, of spring g, substantially as and for the purposes set forth.

Fourth, The combination of nut D, with the curved ends E E, of arms A A, for the purpose of adjusting the arms substantially as set forth.

64,241.—KNITTING MACHINES.—William H. McNary, Brooklyn, N. Y.

First, I claim the combination with the needle ring the presser having the compound motions substantially as and for the purpose described.

Second, Operating the stitch hooks by cranks upon separate shafts carrying gear wheels engaging corresponding wheels on the main shaft, substantially as and for the purpose described, and

Third, Connecting the wheels of the switch wheel directly with the needle ring, substantially as and for the purpose set forth.

64,242.—LAND ROLLER.—Moses Miller, East Gains, N. Y.

I claim the roller B, having an independent frame M, and the cross reaches N N, in combination with the rollers A A, and the frame C, operating in the manner and for the purpose shown and described.

64,243.—WASHING MACHINE.—Clark Moorhead and Isaac Grier, Lewistown, Ill.

We claim the beaters h, hinged to the inner ends or sides of the revolving drum for the uses and purposes above named, substantially as above set forth.

64,244.—GLASS ANNEALING APPARATUS.—George F. Neale and Louis Amede, South Boston, Mass.

We claim the combination of the railway and the system of carriage boxes with the flattening furnace, such railway being so arranged as to enable the said annealing carriages or boxes to be run into and out of the said furnace, and to rest while on that part of the railway which is without it, substantially as specified.

We also claim, for the purpose described, the combination and arrangement of the interior track, 1 1, the turn table, k. or its equivalent, the two exterior tracks, r r and t t, and the transferring carriage, B, provided with the track, u u, as specified.

We also claim the combination and arrangement of the sunken space, h, with the furnace and railway, constructed and arranged substantially as described.

64,245.—BOX FOR PROPAGATING PLANTS.—A. B. Newman, Jr., Watkins, N. Y.

I claim a box or trough for propagating or growing plants, vines, vegetables, small fruits, shrubs, seedlings, and stocks, as herein described.

64,246. — APPARATUS FOR MANUFACTURING LAP-WELDED TUBES.—James Nicholson, Philadelphia, Pa.

I claim in combination a furnace with one or more openings in its front, which will admit of the simultaneous discharge of two or more heated plates or skelps, with a set of rolls having two or more welding grooves, and two or more trains of carrying rollers, all substantially as herein described.

64,247.—COMBINED STOVE COVER, LIFTER, HAMMER, ETC.—Joseph B. Oky (assignor to himself and W. A. Schofield), Indianapolis, Ind.

I claim the utensil herein described, consisting of hoop, B, lips, D D and C, hammer, F, hook, G, and handle. A, provided with a bifurcated end, H, arranged and combined as set forth.

64,248.—POCKET KNIFE.—Charles H. Palmer, Newark, N. J.

First, I claim the spurs, b, formed on the back, B, and combined and arranged with the cheeks, C, and scales, D, substantially in the manner and for the purpose herein specified.

Second, I claim the employment in pocket knives of the spring, E e, mounted separate from the back, and pressed backwards against the same by the opening and shutting of the blade, substantially in the manner and for the purpose herein specified.

Third, I claim the housing or fitting of the spring, E e, within the shoulder or recess formed by the part, B', on the outward or forward extremity of the back, B, the several parts being combined and arranged, substantially as and for the purpose specified.

64,249.—CARRIAGE SHACKLE.—George T. Pearsall, Apalachin, N. Y.

I claim the pintle, B, spur, C, recess, E, spring, D, and socket, F, substantially as described, forming a new and useful improvement in attaching thills or poles to carriages or other vehicles.

64,250.—MANUFACTURE OF SOAP.—Henry Pemberton, Allegheny, Pa.

I claim the preparation of soap from cryolite, substantially in the manner hereinbefore described.

64,251.—BOXES, CANS, OR VESSELS FOR PUTTING UP CAUSTIC ALKALIES, ETC.—Henry Pemberton Alleghany, Pa., and B. Heineman, Natrona, Pa.

We claim protecting the surface external or internal or both, of barrels, cans, or cases made of paper, muslin, wood, or other vegetable substance or either, or either or both surfaces of paper, muslin, or other vegetable fabric for putting up caustic alkalies and other solid or liquid substances which require protection from air or moisture, or which are liable to penetrate their covering, by means of a coating of silicate of soda or potassa, in combination with powdered gypsum, lime or other substance capable of combining therewith, substantially as and for the purposes hereinbefore described.

64,252.—STENCIL PLATE.—George R. Powere, Kingston, Mass.

First, I claim the stencil plate, A, in combination with the shell, B, and handle, D, substantially as specified.

Second, I claim the cylinder, C, provided with notches or grooves in combination with the spring, E, or its equivalent, constructed and operating substantially as and for the purpose specified.

Third, I claim the combination of the cylinder, C, spring, S, and handle, D, as set forth.

64,253.—PROCESS FOR THE MANUFACTURE OF IRON WITH STEEL SURFACE.—Jacob Reese, Pittsburg, Pa.

I claim giving a hard and highly polished surface or a hard surface, susceptible of high polish, to sheet iron and other articles of rolled, forged, or swaged iron by exposing the bar bloom pile or slab, from which such articles are to be rolled, forged, or swaged to partial cementation, so that the iron may be carbureted on the outside to a sufficient depth to give the required steel coating to the article manufactured therefrom, while the interior portion of the mass of iron retains the nature and characteristics of malleable or wrought iron, substantially as hereinbefore described.

Also converting into steel by cementation the exterior of piles, slabs, blooms, or bars of iron, designed to be rolled, forged, or swaged, while the interior or body of the piles, slabs, blooms, or bars remain unconnected and retain the ductility and softness of malleable iron, substantially as and for the purposes hereinbefore described.

64,254.—MACHINE FOR MAKING HORSE SHOES.—Daniel T. Robinson, Boston, Mass.

I claim the shears or cutting mechanism, consisting of the adjustable cutter block, C, and the lever, f, operated by the finger, d, and spring, p3, all constructed and arranged in the manner and for the purpose as before described.

I also claim the mechanism for dipping the punches into water consisting of the arm or carrier, F, friction roller, j', carriage, P, guides, Q Q, and furcated lever, R, the said lever being operated by the lever, J, in the manner as before described.

I also claim the watertank combined with this machine in the manner described.

I also claim the peculiar construction as well as the application of the shaping and reducing dies, j j, as before described.

I also claim combining with the carriage, P, the spring hook, m', and abutment, s2, essentially in manner and for the purpose as before explained.

I also claim the mechanism for operating the sliding carriage, D, the same consisting of the lever, J, bar, M, connecting rod, O, and wiper, K, constructed and combined substantially in manner and to operate as before set forth.

I also claim the combination of the hammer bar of the tripper, n2, and stud, g3, of wiper, K, under the arrangement and for operation as set forth.

I also claim the hook, m2, in combination with the hammer and with the lip, b3, on arm, F, for the purpose of starting the punches from the shoe, substantially as described.

I also claim the peculiar construction and application of the forming die for shaping the snow shoes essentially as described.

I also claim the combination and arrangement as herein described of all the several devices constituting this machine.

64,255.—COTTON-BALE TIE.—Seymour Rogers (assignor to Luman Rogers), Pittsburg, Pa.

First, I claim the loop, c, with the rigid arm, c', when constructed substantially as and for the purposes above set forth.

Second, The loop, c, either with or without the rigid, c', in combination with the corrugated or rigid strap end, a, of a metallic hoop, constructed substantially as and for the purposes above set forth.

Third, The rigid arm, c', of a loop, c, in combination with the slot, e, and the folded end, d, of a metallic hoop, constructed substantially as and for the purposes set forth.

64,256.—PROCESS FOR PRESERVING EGGS.—Henry Scheffer, St. Louis, Mo.

I claim the process of forming a silicious coating by the application of a

silicate and any simple or double alkaline salt, acting substantially as described in process numbered there.

64,257.—BEDSTEAD FASTENING.—Adolph Schlingman, West Alexandria, Ohio.

I claim securing a bedstead rail by a tongue, D, which being screwed or otherwise firmly secured to the post, is traversed by a key, C, which, as it is driven downward, bears against the rear side of the cleat, and acts to close and perfectly secure the joint in the manner set forth.

64,258.—AMALGAMATOR.—A. J. Senatz and G. W. Knowlton, Sacramento, Cal.

We claim the copper-bottomed pans, with the iron rods or bars and slots in the end, fastened to the sides of the pans with pins, and by means of which rods or bars the pans are flattened together, and an undulating motion is secured for the water and earth which are dashed upward against the stationary riffles, whereby the earth or sand is prevented from becoming solid.

We also claim, as a part of the same machine, the turned up ends of these pans, and the stationary riffle beds connected with the pans, all of said parts being the machine in combination which produce the intended effect.

64,259.—PLOW.—James B. Skinner, Rockford, Ill.

First, I claim the brace, d, welded or fastened to the lower part of the standard and the landside, as and for the purpose described.

Second, The arrangement as described of the plow beam, mold board, landside, and handles, with the curved standard and diagonal brace, C, for the purposes of reducing the weight and increasing the strength of the plow as set forth.

Third, The standard constructed and connected with the landside and inner handle, for the purpose of avoiding friction or clogging, as set forth.

Fourth, The arrangement as described of the overlapping lips, i i', on the inner front corners of the mold board and share, for the purposes set forth.

64,260.—APPARATUS FOR BURNING PETROLEUM ETC., IN CONJUNCTION WITH STEAM OR HEATED AIR OR BOTH.—Gideon O. Spencer, Titusville, Pa.

First, I claim providing within the fire box or furnace, for the purposes herein set forth, a solid substance or its equivalent, capable of receiving and retaining the required degree of heat for resolving petroleum or other fluid hydrocarbons into gases, when brought in contact with the same.

Second, The within-described method of supplying the fuel and oxygen, by discharging petroleum or other fluid hydrocarbons through one or more pipes, having their orifices witnin blow pipes or their equivalent, when applied and operated in combination with a heater, substantially as described and for the purposes herein set forth.

Third, The use of one or more blow pipes, or their equivalent, for the purpose of supplying oxygen and concentrating the heat, when applied and operated in combination with the heater, for the purposes herein set forth.

Fourth, The within-described method of revolving and consolving crude petroleum and other fluid hydrocarbons, by impinging one or more currents or jets of the same upon or against a solid heated substance, or its equivalent, within the fire box or furnace, capable of receiving and retaining such a degree of heat as shall resolve said crude petroleum or other fluid hydrocarbons into gases, for the purposes herein set forth.

Fifth, An apparatus for burning crude petroleum and other fluid hydrocarbons, consisting substantially of a heater, one or more pipes for supplying the fluid hydrocarbon, and one or more blow pipes, combined and applied for the purposes herein set forth.

64,261.—SHUTTLE GUARD FOR LOOMS.—E. M. Stevens, Boston, Mass., assignor to Alfred B. Ely, Trustee, Newton, Mass.

I claim the hinged guard, in combination with a positive self-locking device, which shall hold the same in position when down against any blow of the shuttle, while it may be readily unlocked and thrown up by the operative when desired, substantially in the manner and for the purpose set forth.

64,262.—CULTIVATOR.—John P. Tarnutzer, Fond du Lac, Wis.

I claim the shaft, D, with pinion, p, and pinion rack, r, and cap stand head, C, and movable frame, B.

Also the rollers, F F, and sheave, S, upon which a chain passes.

Also the hinges, h h, upon which the frame, E, is hung.

Also the wings, w w.

Also the movable frame, B.

64,263.—BRAND FOR MARKING ANIMALS.—Headley Thompson, Hector, N. Y.

I claim the movable type, A, constructed with stems, A', thereto attached, in combination with the stock, B, constructed with sockets, B', and the thumb screws, C, and arranged for use substantially as and for the purpose set forth.

64,264.—FASTENING FOR WINDOW BLINDS.—L. M. Townsley, Sedalia, Mo.

I claim the combination and arrangement of the catch, D, the springs, d, and the levers, D2 and D3, substantially as described and set forth.

64,265.—WASHING MACHINE.—Adelia Waldron, San Jose, Cal., assignor to herself and J. H. Atkinson, San Francisco, Cal.

I claim the double wash boards, O and K, the eccentric buttons, B, the sash frame, N, with clamp, C, the lever handle, G, the spring, J, in combination and exactly as set forth, and for the purposes specified.

64,266.—WINDOW BRUSH.—John S. White, Boston, Mass.

I claim the improved window brush as made with the flexible backing and the inflexible cap plate connected by a center pin, as and for the purpose set forth.

I also claim the arrangement and combination of the stiffening plate, c, with the cap plate and the inflexible backing and its bristles, as explained.

64,267.—COOKING STOVE.—Charles Williams, Manchester, N. H.

I claim the arrangement of the hearth, U, the ash sifter, G, and box, H, their chambers, D E, and the fire place, A.

I also claim the combination and arrangement of the two ovens, B C, the ash sifter and box chambers, D E, the fire place, A, the flues, I K L M N O P R S and T, and dampers, h l l, as set forth.

64,268.—WASHING MACHINE.—Daniel Williams, Rock, Wis.

First, I claim the tilting washboard, composed of parts, S and S, and slats, c, in combination with part, T, and bearings, e, when both are constructed and used substantially as and for the purposes described.

Second, The roller, R, operated by means of of the framework composed of parts, I K L M N and O, substantially as described in combination with the tilting washboard composed of parts, S and S', and slats, c, when the whole are constructed, connected together and operated substantially as and for the purpose described.

64,269.—PRINTERS' TYPE CASE.—Charles L. Alexander, Washington, D. C.

I claim a type case having the lower or front sides of the boxes inclined toward the upper or rear part of the case, substantially as described.

64,270.—HOOP MACHINE.—John J, Alvord (assignor to himself and Samuel C. Blinn), Tecumseh, Mich.

I claim the arrangement of the arms, O P, pivoted together upon the shaft, M, and having the pawls, R S, secured thereto, ratchet wheel, T, vibrating frame, L, bearing the said shaft, M, the sliding table, K, to which is secured the rack, K,, meshing into the gear wheels, N, and cams, J, upon the shaft, I, substantially as herein set forth for the purpose specified.

64,271.—MODE OF CLEANING WATCHES, JEWELRY, ETC.—James Annin, Le Roy, N. Y.

I claim the process of cleaning watches, jewelry, silver and plated ware, etc., by the ingredients and in the manner substantially as represented and described.

64,272.—HAY AND MANURE FORK.—Jabez H. Babcock, Shortsville, N. Y.

I claim the ferrule, A, and head, B, cast in one piece with holes drilled longitudinally in the head to receive the tines, and holes drilled transversely through the heads for the keys or pins, D, substantially as and for the purpose herein set forth.

64,273.—BUCKLE.—Joseph Barrow, Mobile, Ala.

I claim the buckle constructed of a continuous rigid frame, A, with bars, C, on which are hung the tongues, D, having independent motions and the clasp, F, for holding the ends of the strap, as herein represented and described.

64,274.—GRAIN DRILL.—P. D. Beckwith, Dowagiac, Mich.

I claim the mode herein described of securing or attaching the chain to the bail, A, by means of the rod or hook, d, whereby a simple and permanent attachment without weakening the bail is obtained, substantially as specified.

64,275.—WASHING MACHINE.—G. W. Benton, Dansville, N. Y.

I claim the within-described arrangement and combination of the springs, B, frame, C, concave series of rollers, D, cylinder, a, rubbers, c, springs, E, and adjusting screw rods, F, all operating in the manner and for the purpose specified.

64,276.—WASHING MACHINE.—Joseph W. Bradley, Rocheport, Mo.

I claim the cylinder, G, consisting of the T-shaped slats placed a short distance apart around its periphery, projecting ribs, a, upon the inside of the perforated cylinder heads, grooved or corrugated partition, J, and door, k as herein set forth for the purpose specified.

64,277.—SLIPPER.—Charles R. Broadbent, Boston, Mass.

I claim as a new article of manufacture a slipper or shoe made of paper, substantially as described.

64,278.—COOKING VESSEL FOR FRYING, STEAMING, ETC.—Robert Broome, Central Falls, R. I.

I claim the culinary vessel or utensil herein deecribed composed of parts, A B C and D, when constructed, combined and arranged substantially as set forth.

64,279.—MEAT HAMMER.—A. H. Brown, Springfield, Vt.

I claim a meat hammer having its face or faces provided with one or more annular edges, substantially as and for the purpose herein set forth.

64,280.—ROW LOCK.—George W. Browne, New York City.

I claim the arrangement and combination of the annular plate, C, centrally pivoted thole, D, and plate, B, secured to the gunwale of the boat, as herein set forth.

64,281.—ATTACHMENT FOR DOOR KEYS.—D. E. Campbell, Boston, Mass.

I claim a safety attachment for the keys of doors, consisting of a bar, B, having spring arms or jaws, D D, and a spring sliding catch, G, when arranged and combined together and so as to be used and to operate substantially in the manner described.

64,282.—HEATING STOVE.—W. W. Carpenter, Middletown, N. Y.

I claim the horizontal pipe, E, resting upon the grate, its ends passing through the sides of the stove and supporting the vertical pipe, D, centrally in the furnace, said pipes, D, provided with the adjustable ring, L, and connected to the stove pipe, H, where all are constructed and arranged as herein set forth for the purpose specified.

64,283.—BAG FOR PRESERVING ICE.—William B. Coates (assignor to Thomas Reece and Arthur Clarke), Philadelphia, Pa.

First, I claim the application of woolen bags of one or more thicknesses, for the purpose of preserving ice.

Second, The outside water-proof bag of oil cloth, cotton, duck, rubber cloth, or equivalents, and chamber for drippings, K, the discharge openings at H H, and at G G and N, strap and buckle, D, and cord, E.

Third, The bags, A and B B in combination, the whole being made and constructed as herein described.

64,284.—FIREPLACE HEATER OR FURNACE.—Owen Collins, New York City.

First, I claim the arrangement of the tubular grate bars with relation to the rear and side chambers, K L, of the base communicating there through with the space or spaces within the jacket, M, substantially as specified.

Second, The smoke decomposing chamber, G, made to encompass the fire chamber and communicating therewith by smoke passages, b, also provided with suitable air inlets and outlets, as herein set forth.

The combination of the side and bottom air inlets, h i, to the chamber, L, of the base and controlled by dampers or valves, J, to vary the ingress, essentially as specified.

Fourth, The draft tubes, J, arranged to descend into the fire and controlled by dampers, d, substantially as shown and described.

Fifth, The reversely conical or concave radiating reflectors, N O, and deflector, Q, arranged for operation essentially as represented and described.

64,285.—CLAMP FOR CLOSING RUPTURES IN FIRE HOSE.—P. H. Collins (assignor to Harry Bitter and A. Merritt Asay), Philadelphia, Pa.

I claim the recessed clamps, constructed substantially as described.

64,286.—TICKET CUTTER.—L. O. Crocker, Braintree, Mass., and G. F. Field, Weymouth, Mass.

We claim the arrangement of the stripper, k, with its outer end supported against and operated by a spiral spring or springs, l, and its inner end jointed or connected with and so as to be operated by the counter die jaw, b, substantially as set forth.

We also claim combining with the wire, f, the spring, g, operating as and for the purpose substantially as set forth.

We also claim, in combination with the stripper plate, k (moved from the die before the action of the counter die jaw), the inclination of the cutting face of the die, both laterally and longitudinally, substantially as described.

64,287.—ATTACHMENT FOR ARTIFICIAL TEETH.—John C. K. Crooks, Birmingham, Mich.

I claim the loop or eye, a, provided with the double shank, b, the two ends of which are flattened in line with each other in such a mannert hat their outer extremities shall be widened to a greater degree than their points of connection with the eye thereby being slightly wedge shaped, said shank being inserted in the tooth, A, with the said flattened ends in the longitudinal line of the tooth while the eye itself is at right angles to said line, substantially as herein shown and described.

64,288.—WINDOW SASH.—George Dewey, Blooming Valley, Pa.

First, I claim securing panes of glass in sashes or frames by means of triangular india-rubber strips or pieces, H, substantially as described.

Second, The flat india-rubber strips, d, on the inner faces of window sashes substantially as described.

64,289.—GATE.—Allen O. Divine, Cambria Mills, Mich.

I claim a gate constructed of the hinged parts, A B, as described in combination with the way, m, friction rollers, h and i, and catch, s, so arranged as to form at once a swinging, sliding and folding gate, substantially as set forth.

64,290.—WHIFFLETREE.—E. M. Dodge, Plainview, Minn.

I claim the arrangement of the rods, B B, the bars, C C, and the connecting rod, D, constructed and used as and for the purpose herein specified.

64,291.—POTATO DIGGER.—E. O. Doud and W. F. Beardsley, Penfield, N. Y.

First, We claim, in combination with the shovel, S, the reciprocating hook, H, arranged and operating substantially as shown and described.

Second, Raising the head of hook, H, upon the ways, l, by means of the pivoted lever, y, which is operated by the pin or tappet, t, substantially as and for the purpose set forth.

Third, Attaching the pitman, P', to the shank, O, as shown for the purpose of producing a gentle pressure or force through the pitman, P', upon the rake head, the wrist pin, u, acting as a fulcrum to effect it.

Fourth, In combination with the longitudinally reciprocating raddle or separator, R, the reciprocating cleaner, k, constructed, arranged and operating substantially as and for the purposes set forth.

Fifth, The heads, E, constructed as shown and described in combination with the pitman, r, depressions, r', and pins, c, all operating conjointly as shown and described for the purpose of rotating the cleaner, k.

Sixth, The sinuous slot, T', and rack, q, in combination with the shaft, S', and pinions, F'', for the purpose of raising and lowering the machine and at the same time retaining the pinions, G and G', in gear with the spur wheels of the ground wheels after the machine is lowered sufficiently to put them into gear, as set forth.

Seventh, The sinuous slot, T', in the stock or yokes, J, as shown and for the purposes set forth.

Eighth, The arrangement of the hand wheel, K, shaft, M, ratchet and pawl, w' and y', step box, N, pinion, P, and bevel wheel, B', for the purpose of revolving the ground wheel shaft, S, and retaining the desired elevation or gage of the machine.

Ninth, The relative arrangement of the ground rollers, D, as shown in combination with the shovel, S, and jointed or adjustable tongue, T, in potato diggers, for the purposes set forth.

64,292.—HOSE COUPLING.—J. W. Douglas (assignor to W and B. Douglas), Middletown, Conn.

First, I claim the inclined lugs, B B', provided with corresponding groove and tongue, for the purposes and substantially as described.

Second, I claim the inclined concave grooved nut, C, in combination with the lugs, B B', substantially as described.

64,293.—HEATING DRUM ATTACHMENT FOR FURNACES.—W Duryea, Glen Cove, N. Y., and W. Ennis, Hudson, N. J.

We claim the apparatus constructed substantially as described of tubular radiating smoke boxes, D D', within a chamber, A, partitions, G G', and smoke and air inlets and outlets arranged relatively to each other to establish a circulation through the apparatus, substantially as specified.

64,294.—FURNACE FOR BURNING SAWDUST, ETC.—W. Duryea, Glen Cove, N. Y., and W. Ennis, Hudson, N. J.

First, We claim the combination of the perforated conical fire pot or chamber, B, with its dome-shaped roof, a, and shaking grate, D, fuel-feeding tubes or passages, c, communicating with a drying chamber or receptacle above and regulating plate or valve, C, substantially as specified.

Second, The combination with the fire chamber, B, and fuel supply passages, c, of the air inlets, f, arranged relatively to the passages, d, and dome, a, essentially as herein set forth.

64,295.—PADDLE WHEEL.—Nathaniel T. Edson, New Orleans, La.

First, I claim a combination of the float arms with their lugs, f', the swivel blocks, H, and wheels, A B and F, when wheel, F, is constructed with arms firmly attached to its inner rim and the float arms placed at right angles with the floats.

Second, I claim a combination of the cog wheels, b' and c', when acting and being acted upon by cog wheels, d', and used with wheels, A B and F, substantially as set forth and described.

64,296.—HORSE COLLAR.—E. P. Edstrom, Somerville, Mass.

I claim a horse collar in which the roll is formed upon a core piece, substantially as described.

I also claim in the construction of a horse collar stitching the body part, a, and the face piece, d, of the roll together at the front of the roll when said body part is drawn over the inner side of the roll and the frame without a seam under the roll, substantially as shown and described.

64,297.—RAILROAD RAIL.—R. M. Esterle, San Francisco, Cal.

I claim the railroad rail provided with alternate inclines, A and B, substantially as and for the purposes herein set forth.

64,298.—STRING TAG.—Samuel B. Fay, Franklin, Pa.

I claim the metallic tip, c, formed with a point at one end and oval at the rear whereby the same may be inserted or withdrawn from the goods when used in combination with the string and tag, in the manner and for the purposes set forth.

64,299.—CARRIAGE.—T. A. and A. F. Fisher, Beardstown, Ill.

First, We claim the jointed king bolt H, in combination with the fifth wheel and forward axle, and with the spring, K, attached to the carriage body, D, substantially as herein shown and described and for the purpose set forth.

Second, The combination of the jointed coupling rod, L, with the fifth wheel, G, to which its forward end is attached and with the brace or arm, M, to the lower end of which its rear end is swivelled, substantially as herein shown and described and for the purpose set forth.

64,300.—BUTTONHOLE CUTTER.—Walter Fitzgerald, Boston, Mass.

I claim the arrangement of the stationary bed and movable cutter by which increased lengths of cuts are obtained by movements towards instead of away from the fulcrum of the levers, carrying the cutters and bed, substantially as described.

Also the combination with the cutter and its slotted carrier of the adjusting screws by which the edge of the knife is asligned so as to come into contact with the surface of the bed.

64,301.—PARLOR SKATE.—George Flint, Lowell, Mass.

I claim the middle wheel or runner, c, in combination with the wheels, b and d, arranged substantially as herein described and for the purpose fully set forth.

64,302.—CARRIAGE JACK.—T. L. Goble, Orange, N. Y.

First, I claim the notched rail, E, pivoted at one end to the eccentric lever, D, and at the other end to the pivoted adjustable stand, F, substantially as described for the purpose specified.

Second, The adjustable stand, F, pivoted to the notched rail, E, which is operated by the eccentric lever, D, substantially as described for the purpose specified.

64,303.—GATE.—J. and W. B. Goff, Hornellsville, N. Y.

I claim the arrangement of the metal eyes, x x, pin, I, and loop, J, with gate, A, in the manner and for the purposes set forth.

64,304.—SKATES.—Charles Gooch, Cincinnati, Ohio.

I claim the clamp D, fitting in the holes B, of the foot rest A, consisting of the plates F, with inclined inner edges, and having pronged upright arms G, and adjusted by means of the bolt I and thumb nut J, as herein set forth for the purpose specified.

64,305.—STEAM ENGINE SLIDE VALVE.—H. W. Goodrich and William B. Mason, Boston, Mass.

We claim the combination of the slide valve, a cylinder, a piston and a carriage arranged to operate together substantially as described.

64,306.—STEAM GENERATOR.—Carlos. H. Gould, Cincinnati, Ohio.

First, I claim the annular water space F', communicating in the manner described with a drum or steam box J, and enclosing the fire chamber when conbined with the enclosing non-metallic wall P', and bed P, having the bottom central ventage U, substantially as set forth.

Second, In the described combination with the elements of the preceeding clause, I claim the enclosing air-jacket Z, for the purpose set forth.

Third, In combination with the elements of clause first, I claim the annular descending and centrally discharging flue V, as set forth.

Fourth, The tubular damper 3, in the described arrangement with the flue V, and the bottom of the boiler as explained.

Fifth, The ash spout k, arranged and adapted as and for the purpose represented.

Sixth, In the described combination with the elements of clause first, I claim the feed water pipe f, passing up through the centre of the escape flue, and of the boiler bottom as and for the purpose described.

64,307.—HYDRANT.—D. R. Gould, Chestertown, N. Y.

First, I claim the valve F, constructed as described and provided with the groove a, and arranged in connection with the case B, and the discharge pipe D, substantially as and for the purpose specified.

Second, The arrangement of the plate b, supported upon the spring d, and used in combination with the opening in the bottom of the case B, and the stem E, substantially as and for the purpose specified.

64,308.—TENONING CUTTER HEAD.—James S. Graham, (assignor to himself and C. R. Tompkins), Rochester, N. Y.

I claim the arrangement of the knives or cutters k, constructed substantially as shown and described upon the longitudinally curved bed a, of the head H, of tenoning machines, for the purpose herein set forth.

64,309.—BOAT BUILDER'S PLATFORM.—J. Granger, Zanesville, Ohio.

First, I claim pivoted the tilting platform to the post a, so that when the platform is tilted the entire weight of the platform and the boat will rest upon the ground, substantially as described, for the purpose specified.

Second, The post, A, with its inclined shoulders, to which the platform, B, is pivoted at a distance nearer to its inner end than at the outer, so that when the platform is lowered, the weight is upon the ground on the foundation in the manner as and for the purpose specified.

64,310.—WATER METER.—Thomas Green, Brooklyn, N. Y.

First, I claim a water meter constructed substantially as and for the purposes herein specified.

Second, I claim the water gate, B, the valve box, C, and the slide rod, m, in combination with the cylinder, A, constructed and operating substantially in the manner and for the purposes herein described.

64,311.—SUPPORTER.—P. S. Greenamyer, Smithville, Ohio.

I claim the belt, A, carrying the uterine supporter, C, with its straps and arms when used in combination with the shoulder straps, D D, and their respective connecting straps all arranged in the manner and for the purpose specified.

64,312.—GLASS WARE MOLDS.—Robert E. Haines, Cambridge, Mass., assignor to Boston Silver Glass Company, Boston, Mass.

I claim the employment of hinged clasping bands constructed and arranged to operate substantially as described to hold the upper section when made whole of a glass ware mold to lower sections thereof, when made in parts.

64,313.—MACHINE FOR PRESSING TWEERS.—L. M. Hart (assignor to himself and Charles S. Hinchman), Philadelphia, Pa.,

I claim in combination with a traversing core mold a traversing carriage carrying two or more molds for making tweers or other articles of clay or other plastic substances.

64,314.—SKATE.—John Hartman, Jr. Philadelphia, Pa. Antedated Oct. 30, 1866.

First, I claim tightening the skate by means of a supplementary plate, D, operated by a screw, E, substantially in the manner above described.

Second, The combination and arrangement of the swivel clamping plates, F and F', with the sole, B, by means of the adjustable fulcrum pin, G, substantially in the manner and for the purpose above set fortn.

64,315.—TELEGRAPH INSULATOR.—Stephen C. Hendrickson, New York City. Antedated April 24, 1867.

First, I claim a drip insulator arranged in connection with the guttapercha coverings of telegraph wires, substantially as described and for the purpose set forth.

Second, The trunk piece, G, the bell, M, the inverted bell, O, the trunk piece, P, and the gutta percha connections at J and Q, constructed substantially as and for the purpose described.

64,316.—GUIDE FOR AXLE BOXES.—Robert Hitchcock (assignor to John Mulligan and John H. Hare), Springfield, Mass.

The detachable metallic guide plates, B B, provided with flanges, d d, upon their inner edges and having the wedged shaped projections, b, fitting into the wedged shaped grooves in the jaws, A, when all are constructed and arranged as herein set forth for the purpose specified.

64,317.—GATE.—Windsor Holdredge, Oxford, N. Y.

I claim connecting the expansible and contractable gate, p q, with the hinged platforms, J J, by means of the descending arms, K K, the horizontal levers, l l, the horizontal shaft, m, the vertical arm, n, and the crooked lever, y, in such a manner that the depression and elevation of either of said platforms will operate said gate, substantially in the manner herein set forth.

64,318.—HAND SPRING FOR MACHINERY.—Parley Howe, Staffordville, Conn.

I claim the hand spring constructed, arranged and applied substantially as and for the purpose described.

64,319.—DEVICE FOR SUSPENDING LAMPS.—David T. Hubbell, Bethel, Conn.

First, I claim the arrangement and combination of the mechanism consisting of the drum, B, spring, D, roller, T, claws, H, and chains, C, with frame, N, as and for the purpose set forth.

Second, I claim the pendant, A, with its central opening and slot, I, in combination with the above operating mechanism as and for the purpose set forth.

64,320.—HAND STAMP.—Thomas S. Hudson, East Cambridge, Mass.

First, I claim operating both of the type wheels, G H, by their spindle, I in the manner and for the purpose set forth.

Second, I also claim the type wheels, G H, provided with notches, e, in combination with the spindle, I, with its projection, f, and spring, g, operating substantially as and for the purpose set forth.

Third, I also claim the type wheels, G H, with the characters marked on their sides, substantially as described in combination with a casing, E, provided with its holes, c d, substantially as and for the purpose set forth.

Fourth, I also claim the key, L, or its equivalent for locking the type block, K, in place, substantially as described.

64,321.—PROCESS OF CONCENTRATING THE EXTRACT OF BARK FOR TANNING AND OTHER PURPOSES.—Benjamin Irving, New York City.

I claim the method of process hereinbefore described of treating the extracts of bark for concentrating it by a continuous operation in a vacuum worm or evaporating tables, substantially as set forth.

64,322.—MACHINERY FOR OBTAINING THE EXTRACT OF BARK FOR TANNING AND OTHER PURPOSES.—Benjamin Irving, New York City.

I claim, First, The combination and arrangement of the rollers, E and D', and D2, with the trough, F, substantially as hereinbefore described and for the purposes set forth.

Second, The combination of the pipes, G2 and G3, with the water trough, F, for the purposes hereinbefore set forth.

Third, The combination and arrangement of the rollers, E and D' and D1' with the water box, F, and collecting trough, J, for the purposes hereinbefore set forth.

Fourth, In combination with the rollers, E D', and D2, the endless apron P, and water box, V, for the purposes hereinbefore set forth.

Fifth, In combination with the endless apron, P, and water box, V, the pressure rollers, U and U2, for the purposes hereinbefore set forth.

Sixth, The combination of the rollers, E and V, with the steam pipe, N2, for the purposes hereinbefore set forth.

64,323.—PROCESS FOR OBTAINING THE EXTRACT OF BARK FOR TANNING AND OTHER PURPOSES.—Benjamin Irving, New York City.

I claim the method of treating bark for obtaining the extract thereof for

tanning and other purposes by the process, substantially as hereinbefore described.

64,324.—APPARATUS FOR CONCENTRATING THE EXTRACT OF BARK FOR TANNING AND OTHER PURPOSES.—Benjamin Irving, New York City.

I claim, First, The use of a flat worm made of corrugated sheets or plates of metal, substantially as hereinbefore set forth, and for the purposes described.

Second, In combination with a flat worm made substantially as hereinbefore described, a steam chamber or box for the purposes set forth.

Third, The use of one or more tanks, H, and I, in combination with connecting pipes, G', and J, and exhausting pipe, L, arranged and operating substantially as hereinbefore set forth.

Fourth, The combination of the flat worm made as hereinbefore described with one or more tanks, H and I, by means of the pipes, F and K, for the purposes hereinbefore set forth.

64,325.—APPARATUS FOR CONCENTRATING EXTRACTS FROM BARK FOR TANNERY.—Benjamin Irving, New York City.

I claim the combination of the worms, or of coils of cylindrical pipes made as hereinbefore described with the steam chamber for the purpose of concentrating extracts from barks for tanning purposes.

64,326.—STEAM GENERATOR.—C. W. Isbell, New York City, and P. W. Mackenzie, Jersey City, N. J. Antedated April 22, 1867.

First, We claim the steam generating rings or sections, F, constructed with radial finger-shaped tubes, H, of tapering or diminishing form from their outer and open ends toward their inner and closed extremities, substantially as specified.

Second, In combination with a series of said rings or sections, F, a cylindrical shell or casing inclosing an annular water space, B, forming a steam generator with flue spaces, b, between and around the pockets, H, substantially as herein set forth.

64,327. — SELF-ADJUSTING NECK YOKE. — John Jacobs, Oneida, Ill.

I claim the swivel loop, C and plate, B, or their equivalents constructed substantially as specified and used with a neck yoke as and for the purpose herein set forth.

64,328.—STRIKING ATTACHMENT TO CLOCKS.—Abijah Johnson, West Newton, Ind.

I claim the ring, B, placed and figured as shown and perforated for the insertion of pins to operate the striking machinery of a clock, and in combination therewith the movable pins, C, substantially as and for the purpose set forth.

64,329.—HORSE RAKE.—S. A. and L. M. Kays, Independence, Iowa.

First, We claim the lever, I, and curved bar, K, in combination with the rake head, F, and pendant lever, J, for the purposes and substantially as shown and described.

Second, We also claim the spiral spring, b, in combination with the bar, K, and lever, I, substantially as shown and described and for the purposes set forth.

64,330.—REFRIGERATOR.—Moses W. Kidder and Moses W. Shorey, Lowell, Mass.

We claim, First, The arrangement of the induction tube, B, within the eduction tube or passage, I, in the manner and for the purpose set forth.

Second, The use and application of valves, b and f, to the back or either side of each or any of the compartments, said valves being operated by opening and closing the inner doors, substantially as and for the purpose explained.

Third, The combination of the tubes, pipes or passages arranged for ventilation as set forth the valves, b and f, and rods, e, with the refrigerator, the whole arranged to operate, substantially as and for the purpose set forth.

64,331.—HORSE HAY RAKE.—John G. Kimberlin, Dryden, N. Y.

I claim the continuous chain, g, provided with an intermediate spring, h, in combination with the lever, C, and rake head, C, substantially as described for the purpose specified.

64,332.—WELL TUBE.—Hiram Knapp and Warren H. Pease, Goshen, Ind.

We claim the combination of the slotted tube, A, plug, F, spiral wire, C, screen, D, encasing cylinder, E, substantially as described for the purpose specified.

64,333.—QUARTZ CRUSHER.—A. Komp, New York City.

I claim the oscillating crushing and grinding jaw, E E' in combination with the revolving jaw, C C', constructed substantially as and for the purpose described.

64,334.—BEE HIVE.—William Kraiss (assignor to himself, Jacob Beckman and Myron Silverthorn), Fair View, Pa.

I claim the arrangement of one or more hives provided with chambers, P, frames, F, lining box, H, drawer, J, and external slides, K, as described, in combination with an external bee house or casing in such manner as to leave the spaces, A B N, between the sides flooring and roof of the hive and the external casing thereof filled with ashes or other poor conductor of heat, substantially as and for the purposes set forth.

64,335.—PORTABLE FENCE.—Israel L. Landis, Lancaster, Pa.

I claim the construction of the notched brace, E, with its pins, G, or rod, G, when combined or used with a rail or pole fence, fastened together with pins, B, as herein described and for the purpose set forth.

64,336.— DERRICK.—James S. Lester and Lyman G. Jennings, Lafayette, Ind.

First, What we claim is the combination of the revolving or swinging adjustable frame, D E F, with the vertical post or cylinder, A, substantially as herein shown and described.

Second, The combination of the revolving pulley bore, G, with the vertical post or cylinder, A, substantially as herein shown and described.

Third, An improved derrick formed by the combination of the pulley box or frame, G, the adjustable frame, D E F, the vertical post or cylinder, A, and the adjustable braces, B, with each other, substantially as herein shown and described.

Fourth, Connecting the ropes, J K, and pulleys, H I, with each other with pulley box or frame, G, and with the swinging frame, D E F, in such a way that one of the platforms attached to said ropes may be raised at the same time and by the same operation by which the other is lowered, substantially as herein shown and described.

64,337.—PUMPS.—Thomas Ling, New York City.

I claim the bar, G, brakes, K K', one or more, and bar, E arranged and applied to a rising and falling pump body, substantially as and for the purpose herein set forth.

64,338.—COMPOUND FOR IMPROVING THE QUALITY OF IRON. —T. Jones and W. Morgan, Pittsburg, Pa.

We claim the use and application of the above described compound, for the purpose set forth.

64,339.—MILL FOR CRUSHING ORE.—Simon F. Mackie, New York City.

First, I claim the combination of the cylinder stamp heads, a, covers, c, pistons, f, piston rods, g, cross heads, y, connecting rods, r, crank shaft, x, and guides, u, with the bed, k, and screen l, substantially as herein described, and for the purposes herein set forth.

Second, The plate, z, in combination with the flanged stamp head as described.

64,340.—LATTICE AND TRUSS BRIDGE.—G. B. Manley, Cogans, Station, Pa., assignor to himself and Timothy O. Vanalen, Danville, Pa.

First, I claim the method and arrangement of interlocking the wrought iron strings and braces of a lattice work truss for bridges in the manner herein described.

Second, The brace block, D, in combination with the grooved and ribbed beams of strings, A and C, fitted and secured between them as and for the purpose herein described.

64,341.—PLANE IRON.—S. Markee (assignor to himself and John M. Easterley), Auburn, N.Y.

I claim the plane iron consisting of the slotted iron, A, curved cap, C, flanged sliding nut, D, and screw, B, arranged and operating substantially as described for the purpose specified.

64,342.—KNIFE SHARPENER.— George B. Markham, Plymouth, Mich.

I claim the adjustable guide rest, e, attached to the frame branch, b, by an arm, d, when constructed as described and arranged in relation to the beveled grindstone, A, and its metal supporting frame as herein set forth for the purpose specified.

64,343.—MANUFACTURE OF FUEL FROM ANTHRACITE COAL DUST.—Edward G. Markley, Borough Sunbury, Pa., and George H. Bardwell, Philadelphia, Pa.

We claim the improved anthracite block as above described and set out, made of the materials combined in substantially the proportions above set forth.

64,344.—HANGER AND JOURNAL BOX FOR SHAFTING.—Isaac D. Mathews, Worcester, Mass.

First, I claim the combination of the main part, A, having a slot, g, projections, b F, screw bolts, D G, and e, with the bearing piece, E, and box, C said parts being constructed and arranged for joint operation, substantially as and for the purposes set forth.

Second, The combination of screw, t, and cap, d, with the journal box, C, and projection, b, of the hanger part, A, substantially as and for the purpose set forth.

Third, The combination with the concaved bearing part, E, and cap, d, having projections, n e, as shown of the journal box, C, having slots or recesses, ff, for the purposes set forth.

Fourth, The combination of nut, h, and screw, G, with the projection, F, and oil or drip-pan, H, substantially as set forth.

64,345.—HARVESTER RAKE.—Andrew J. Martin, Rockford, Ill.

First. I claim driving an automatic rake by a series of concave elliptic bevel gears, substantially in the manner and for the purpose described.

Second, The combination of a slotted rake arm moving horizontally over the platform, with two crank arms, arranged one behind the other and driven by elliptic gearing, substantially in the manner and for the purpose described.

Third. The combination of the recessed pinion, E, with the loop, e, when arranged and operating as described to throw the rake into and out of gear.

Fourth, The combination of the rigid rake head, T, with the yielding teeth, when arranged and operating as described.

64,346.—DRAY.—C. S. Martin, Milwaukie, Wis.

I claim a dray constructed with springs of india-rubber, D, placed between the guide plates, E, attached to the axle, C, and vertically sliding jaws, B, attached below the body, A, and strengthened by braces, G, said parts being combined and arranged substantially as described.

64,347.—MODE OF USING STEAM FOR HEATING AND EVAPORATING.—Helem Merrill, Philadelphia, Pa.

I claim the retaining of the water in the receiving and discharging cylinders until at required hight it exerts a power sufficient to perform the operations substantially as described and set forth.

Second, The independent float as connected and combined with the stop cocks making the whole apparatus self-acting for the purposes, substantially as set forth and described.

Third, I claim the method of returning the water of condensation to the boiler, substantially as described.

64,348.—CHURN.—J. W. Myers, Lyons, Iowa.

First, I claim the stationary, breaker, H.

Second, The revolving perforated cylinder, L R J K.

Third, The combination and arrangement of these parts in connection with the other parts when constructed and operating substantially as and for the purpose set forth.

64,349.—HAY RACK.—William Nash, Corning, N. Y.

First, I claim the drawers, F F, placed so as to be drawn out at the ends from under the longitudinal slats d d d d, which form the support for the hay in the rack, the drawers, F F, being so arranged as to receive and save the grass seed after it is liberated from the hay in feeding, substantially in the manner and for the purposes herein described.

Second, I claim the combination for the side troughs, E E, hay rack B, and drawers, F F, constructed and operating substantially as and for the purposes herein set forth.

64,350.—GRAVEL WAGON.—Adam Neer, Bellefontanie, Ohio.

First, I claim the combination of the rope L, pulleys M, and O, reel or drum, I, and crank, R; with each other and with the box, I, and frame, F, substantially as herein shown and described and for the purpose set forth.

Second, The combination of the rope, S, pulley, T, reel or drum, U, and crank, V, with each other and with the box, I, and frame, F, substantially as herein shown and described and for the purpose set forth.

64,351.—MACHINE FOR BENDING TIRES.—J. A. Niman and B. Fidler, Mansfield, Ohio.

We claim the right and left hand screw, I, provided with a collar, H, working in a recess in the bed of the machine combined with the sliding or traversing roller carriages, E, which carry the rollers, B, which said screw is tapped or screwed into and through the said roller carriages. F, and by means of which said combination we are enabled to set the rollers, B, equidistant nearer to or further from the central roller, A, for the purpose required and retain them in place all of which is substantially set forth, described and shown in the accompanying drawings and in this specification.

64,352.—MANUFACTURE OF FIRE BRICK.—George Nimmo, Jersey City, N. J.

I claim the employment of the residuum of the combustion of coal as the base or principal component in the manufacture of fire bricks retorts, furnace linings, pots and similar articles as and for the purposes specified.

64,353.—MANUFACTURING METALS, GLASS AND POTTERY.— E. W. Nohe, Ripon, Wis.

I claim the manufacture of metals from the ore without the usual mixture with the latter of coal or other solid face by the means of the combustion of gas generated for the purpose and brought directly into the furnace and burned in combination with a blast of air substantially in the manner and for the purposes set forth.

64,354.—PICKER MOTION FOR LOOMS.—William Nugent, North Providence, R. I.

First, I claim the rail, A, provided with cavity, I, in which plays the pin of the arm, I, of the slotted block, G, which carries the staff, C, and rocker, E, and having horizontal slot, L, through which slot and the vertical block of the slot G, plays the bolt, F, encircled by the sleeve, a, and operating in the manner herein represented and described.

Second, I also claim the cavity, I, in the side of the rail, A, in combination with the block, G, whose arm, J, has a pin that works in said cavity, substantially as shown.

64,355.—STEAM GENERATOR.—R. J. Nunn, Savannah, Ga.

First, Steam generator or boiler constructed entirely of tubes or pipes when such tubes or pipes are arranged and connected together, and protected from the direct action of the fire substantially in the manner herein described.

Second, I claim the interior circulation tubes herein described when the said tubes are perforated in the manner and secured in their position in the manner substantially as described when used in the vertical tube of a boiler, as and for the purposes set forth.

64,356.—AUTOMATIC BOILER FEEDERS.—Saml. J. Parker, Williamsport, Pa.

First, I claim the within described arrangement of the vessel, C, with the tube, D, and fixed pipe, M, in combination with suitable packing, e and a, boiler and a water tank substantially in the manner and for the purposes herein set forth.

Second, I claim in combination with the above the arrangement of the passages, d, relatively to the movable part, C, adapted to discharge steam from beneath the packings, e, substantially in the manner and for the purpose herein set forth.

64,357.—DRILLING MACHINE.—Wm. F. Parker, Andover, Mass.

I claim the combination of the pawl, N, with the ratchel wheel K, the cam, M, and the slide, P, for the purposes herein set forth and described.

In combination with the subject matter of the foregoing clause and with the supporting frame, I, claim the top piece a, arranged as described.

64,358.—GANG PLOW.—Horace L. Perry, Aurora, N. Y.

First, I claim the cast-steel plows, D, when constructed and used in combination with the hinged plow frame, C, main frame, A, and wheels, B, B, for the purposes and substantially as herein described.

Second, The combination and arrangement of the pinions, E E, crank shaft, F, hinged racks, G G, ratchel wheel, H, and stop lever, H,' for the purposes and substantially as herein set forth.

64,359.—SHEEP SHEARING TABLE.—Oliver Perry, W. N. Welles and Clark Perry, Ortonville, Mich.

We claim the combination and arrangement of the table, A, swinging frames, B B,' rope g, and treadle C, all constructed and operating in the manner substantially as and for the purposes herein specified.

64,360.—MUSICAL DIAL.—Nicolai Peterson, Columbus, Miss.

First, I claim a musical dial substantially as and for the purpose described.

Second, The combination of the movable dial, B, with the stationary main dial, A, as and for the purpose set forth.

64,361.—APPARATUS FOR CARBURETING GAS, and AIR.— George W. Porter, Boston, Mass.

First, I claim the construction and arrangement of the hooks in the side of the box, A, their inner ends pointing in opposite directions retained by means of the spiral springs, J, and capable of being adjusted whereby a breach is made in the capillary substance as and for the purpose specified.

Second, The construction and arrangement within the box, A, of the purforated plates adjusted by means of the thumb-screw a, whereby the capilliary substance is compressed or released as herein set forth for the purpose specified.

64,362.—FLEXIBLE TUBING, OR HOSE.—Thomas L. Reed, (assignor to Atlantic Tubing Co.,) Providence, R. I.

I claim the flexible impervious tubing formed by combining the non-collapsable tube with a sheath or tube of India rubber. or other vulcanizable gums or compounds by the means and substantially as described for the purpose specified.

64,363.—FENCE.—Walter Reed, Wayne, N. Y.

I claim an improved fence formed by the combination of the stakes, C, and D, and lock-bar, E, with each other and with the panel or panels of the fence substantially in the manner herein shown and described and for the purpose set forth.

64,364—APPARATUS FOR HEADING WRENCH-BARS.—T. C. Rice, (assignor to Thomas H. Dodge and T. W. Wellington), Worcester, Mass.

First, I claim the combination of the sliding table, C, perforated in the manner described, with the horizontal rolls, H, H, for reducing the head of the wrench to the proper thickness substantially as set forth.

Second, the combination of the grooved table or bed, C, perforated in the manner described with the vertical friction roll, K, for reducing the head of the wrench to the proper depth while the sides are prevented from lateral expansion substantially as set forth.

Third, the combination of the friction roll, K, with the grooved table or bed, C, provided with the inclined hole, h, for reducing one part only of the head and giving it the proper inclination substantially as set forth.

Fourth, The combination with the friction roll, K, of the grooved table C, when provided with the inclined hole or perforation, h, notch, z, and pit, u, for receiving the surplus metal as set forth,

Fifth, The combination in the sliding table, C, of the hole, g, with the sides o, o, and projection p, substantially as and for the purposes set forth.

Sixth, The combination of the perforated table, C, for holding the wrench head in different positions with the friction rolls and the rack and gear or other actuating mechanism the whole being arranged and operated to reduce and shape the wrench head substantially in the manner herein specified.

64,365.—WHIP RACK.—Edward Richmond, Brooklyn, N. Y.

First, the wedge shaped opening formed in a rack as described of a hook or guide of metal or other suitable material secured in the said rack under such an arrangement that the portion of the said hook which guides and maintains the whip lash or tip in its proper relation to the opening, shall be parallel or nearly so with the face of the rack, and transverse to the length of the opening over which it is placed substantially as shown and set forth.

Second, The combination with a wedge or V-shaped slot formed on the edge of whip rack of adjustable guide or hook, corrugated or bent at the point where it traverses the slot above which is is placed and pivoted to the top of the rack so that it may be moved to lessen the width of the said slot substantially as and for the purposes shown and described,

64,366.—TICKET SAFE AND ALARM BELL.—Edward Richmond and Joseph G. Moody, of New York, N. Y.

First, We claim ticket safe or receptacle the same consisting of a box slotted to admit of the insertion of the tickets and provided with a door in which openings are formed and an inside leaf or plate held against the door by means of spring, the said door and spring leaf being held to the box in such manner as that the tickets when inserted through the said slot may be securely held between them as herein shown and set forth.

Second, The combination with slotted box or safe of the hinged door and inside spring leaf or plate having formed on their upper ends flanges or lips which overlap each other so as to prevent the withdrawal of the tickets placed within the said box substantially as herein shown and described.

Third, The combination with the herein described ticket safe of an alarm bell attached to said safe substantially in the manner and for the purpose herein shown and specified.

64,367.—CHURN.—John L. Riter and R. C. Swann, (assignors to themselves and T. J. West and R. B. Perry), Brownsville, Ind.

We claim the arrangement of the shaft and fly-wheel, E, with plate, G, having a pin, Z, near its periphery which works into a slotted plate, d, upon the side of the churn, C, for operating said churn box, upon its bearings as herein set forth.

64,368.—THILL COUPLING.—Silas Rogers, Stamfordville, N. Y.

I claim a thill coupling composed of the plate, C, attached to the lip, A, and having a curved front end, and the thill iron, D, provided with a slot, c, and connected to the plate, C, by means of a groove and pin arranged as shown and described, or in an equivalent way.

64,369.—PAINT BRUSH.—H. Rosenthal, New York City.

I claim the combination of the ferrule, C, socket plate or disk, E, handle, B, and bristles A, when the latter are secured together, substantially as set forth.

64,370.—CULTIVATOR.—Anson P. Routt, Liberty Mills, Va.

I claim the changeable, reversible and adjustable share secured by loops, G, and keys or wedges, g, upon the curved sheaths or shanks C', whose points enter the holes or notches in the shovel or plough to secure and steady it in any posititon which it may be adjusted, substantially as set forth.

64,371.—PIANO FORTE.—T. J. V. Roz, Paris, France.

First, I claim the construction of the back or bottom of the piano of round or oval columns, F, in combination with an iron frame, a a', and bars, A, and the bar, b, as and for the purposes specified.

Second, I claim the piano action composed of the levers, O', lifter, o, and lever, O*, applied in the manner specified so that the same shall be separate from the key board, in order that one key board may be moved away and another brought into place as set forth.

Third, I claim the anti-friction supports, J L', winch, 9, cord, 16, and tightening screw, l', in combination with the transposing key board, 1, and rack, l', for moving said key board with facility and retaining it in place, as set forth.

Fourth, I claim the small or elementary key boards, fitted so as to be movable, and applied in the manner specified, to act upon the same notes as the main key board, as and for the purposes specified.

Fifth, I claim the cards connected with the respective notes and raised by the depression of the note so as to exhibit the name and sound of the particular note to aid in the instruction of elementary music, as set forth.

Sixth, I claim a series of levers composing the action between the keys and hammers, said action connecting on one line with the keys and lengthened downwards at the bass end, and projected upwards at the treble end, the intermediate connections being graduated so as to reach the hammer above the notes at the treble end, and below the notes at the bass end, as specified.

64,372.—DOOR SPRING.—Cyrus W. Saladee, Newark, Ohio.

I claim the box or cylinder, A, secured rigidly to the door or gate in combination with the arm, B, and standard, D, in the manner and for the purpose substantially as shown and described.

Second, I claim the standard, D, or its equivalent, when provided with a series of bearings or holes, 1, 2, 3, fig. 3, in combination with the arm, B, substantially as and for the purpose specified.

Fourth, I claim, in combination with the arm, B, the indentation, x, substantially as and for the purpose described.

Fifth, I also claim the combination of the adjustable arm, B, standard, D, follower, E, spring, C, and the box or cylinder, A, or their equivalents, arranged and operating in the manner and for the purpose substantially as shown and described.

64,373.—METHOD OF STARTING AND STOPPING STREET CARS. —Edwin M. Scott, Auburn, N. Y.

First, I claim the fixed pinion, c, in combination with gear, d, and slotted racks, e f, as and for the purpose specified.

Second, I in combination with the above I claim spring, E, elbows, h h, and levers, 1 1, all arranged as and for the purpose set forth and described.

64,374.—PHOTOGRAPHIC PRINTING FRAME.—Jonathan T. Shoemaker, Van Wert Co., Ohio.

I claim the folding-back photographic printing frame, substantially as herein described.

64,375.—MACHINE FOR PRINTING NUMBERS.—C. Latham Sholes, Milwaukee, Wis.

First, I claim the disks, E, provided with the dogs, r, and projections, e', in combination with the plate, d, when arranged to operate as an for the purpose set forth.

Second, I claim operating the disks, E, by means of the projecting pins, t, and the cam, c, arranged to operate as shown and described.

Third, I claim aligning the disks, E, by means of the V-shaped notches and the locking bar, x, operating substantially as set forth.

Fourth, I claim the sliding bar, x, with its spring, m, and the oscillating cam or guide, a, when said parts are arranged for joint action, substantially as herein set forth.

64,376.—CORN CULTIVATOR.—George Sprague, Spring Hill, Kansas.

I claim the combination of the root cutters, F F, the shovels, d d, and the plough beams, E E, arranged and connected for adjustment and operation, substantially as and for the purposes herein described.

64,377.—LANTERN.—W. G. and C. Sterling, New York City.

We claim the guards, A A, attached to the circular part, B, in combination with the catch, D, or lugs, G G, or their equivalent.

We claim the eyelet clamps, fig. 3, when used for the purpose above described.

64,378.—CAR TRUCK.—S. G. Steves, Jamestown, N. Y.

I claim the car truck frame, A, in combination with the braces, J J', chord, H, and tension rod, K, and so constructed that the sides of said truck form a truss by which it is suspended below the axles, in the manner and for the purpose substantially as set forth.

64,379.—FENCE.—H. M. Stoker, Watson, Ill.

I claim the two-fold adjustability of the ports of the panels, L and H, in combination with bars, E, connecting pins, t, and binders, C, and pointed posts, A, the whole constructed, arranged, and operating in the manner and for the purpose substantially as herein set forth.

64,380.—FIFTH WHEEL FOR WAGONS.—James B. Stuart, Bunker Hill, Ill.

I claim a circle plate or fifth wheel for vehicles composed of the frame, A, and plate, B, connected by a bolt, d, and attached respectively to the front axle and bolster, substantially in the manner as and for the purpose herein set forth.

64,381.—SHANK AND SOCKET FOR HAND HAY FORKS.—F. F. Terry, Fort Gibson, N. Y.

I claim, First, Locking the several tines, t, to the shank or head, S, by a single key, substantially in the manner herein shown and described and for the purpose set forth.

Second, Providing the head or shank, S, with round holes to receive the wire tines, t, as and for the purposes shown and described.

Third, The arrangement of the handle socket or ferrule, C, in connection with the receiving shank, S, as and for the purpose herein set forth.

64,382.—GAS GENERATOR AND CARBURETOR.—Wm. Thompson (assignor to the Cleveland Gas Machine Company), Cleveland, Ohio.

I claim, First, The corrugated cylinder, C, annular chamber, e, as arranged in combination with the chains, f, and buckets, g, for the purpose and in the manner as described.

Second, The heater, S, burner, Y, pipe, Q, in combination with the carburetor, W, case, P, and gasometer, Y, for the purpose and in the manner as set forth.

Third, The cylinder, C, diaphragm, F, valves, I and K, in combination with the generator, B, for the purpose and in the manner substantially as described.

Fourth, The pipe, j, sleeve, h, in combination with the corrugated cylinder, C, for the purpose and in the manner specified.

64,383.—WEATHER STRIP.—E. P. and E. S. Terry, New York City.

We claim, First, a weather strip formed of a single piece of molding as herein described and shown in Fig. 5, with a strip of india rubber or other suitable material, applied therein, as specified, for covering joints on level surfaces, substantially as above specified.

Second, We also claim the weather strip shown in Fig. 6, for guarding joints in angles, constructed as and for the purpose herein set forth.

64,384.—STUMP EXTRACTOR.—George W. Townsend, Galesburg, Mich.

I claim the pulleys, a and a'. arranged substantially as herein shown and described, in combination with the draught bar, C, and pitmans, E.

I also claim the double crank shaft, D, the gear wheel, F, and the pinion, H, in combination with the draft bar, C, and pitmans, E, substantially as herein specified.

64,385.—PROCESS IN THE MANUFACTURE OF BICARBONATE OF SODA.—Alois Pohr von Pohrnhoff, Brooklyn, N. Y.

I claim a process of manufacturing bicarbonate of soda without admixture of crystal of sal-soda from hydrate of soda, and as such alone without submitting the latter to a previous procedure and through the simultaneous influx of carbonic gas and water, steam created by said gas, for the purpose and in a manner substantially as described above.

64,386.—WASHING MACHINE.—Edward L. Walker, Jenner's Cross Roads, Pa.

I claim, First, The removable cover or its equivalent, against which the compression of the clothes if effected substantially as described.

Second, The compressor operated from beneath against the stationary or adjustable cover or its equivalent, substantially as described.

Third, The box or tube provided with a series of sockets or their equivalents, for graduating or adjusting the height of the removable top or cover, substantially as described.

Fourth, The arrangement of means for operating the lifting compressor, consisting of uprights attached to said compressor, pivoted fulcrum standards, and the lever frame, or their equivalents, substantially as described.

Fifth, A compressing cover provided with a rubber board on its under surface, and arranged to turn on pivots over against the side of the frame, in the manner and for the purpose described.

64,387.—CARPET STRETCHER.—Willis Weaver, Salem, Ohio.

I claim, First, An improved carpet stretcher, formed by the combination of the pivoted toothed plate, B, pivoted wire loop, C, or equivalent and the lever, A, with each other, substantially as herein shown and described.

Second, The combination of the spring, E, with the pivoted toothed plate, B, and lever, A, substantially as herein shown and described, and for the purpose set forth.

64,388.—HOLDER FOR SLOTTED TOOLS.—T. L. Webster, Brooklyn, N. Y.

I claim the tool holder for slotting machines, constructed as described, consisting of the parts, a b, fitted together and connecting by the pin, c, to form a joint which will admit of the slotted part, b, moving only in one direction, spring, B, fitted in the recess, c, of the part, a, substantially as herein shown and described.

64,389.—MANUFACTURE OF FIRE BRICK.—Samuel R. Wellman, Nashua, N. H.

I claim the use of a diamond rock in the manufacture of fire bricks, furnace linings, and similar articles, substantially as described.

64,390.—CORN PLANTER.—John D. Wells, Franklin County, Ohio.

I claim the application of a driving wheel with a crank attached for operating the valves, together with the arrangement and particular combination of the several parts named as above described, or substantially the same as would answer the intended purpose.

64,391.—DIVIDERS.—Horatio Whiting, New York City.

I claim the construction and arrangement of the annular-flanged screw nut, F, provided with a screw thread upon its inside, and hung in the slot, E, in the leg, B, upon the arm, D, the latter provided with teeth upon its upper side and passing through the slot in the leg, B, at right angles with the slot, E, the said screw nut being held in place by means of the spring, G, in the slot, E, substantially as described for the purpose specified.

64,392.—PROPELLING BOATS.—Elijah Williams, Marianna, Fla.

I claim First, The combination of the pawls, O, O, with the springs, P. P, and the driving wheels, F, the pinion wheel, E, the ratchet wheel, D, and the paddle wheels, B, B, all constructed and operated substantially in the manner and for the purposes herein before set forth.

Second, I claim in combination with the above, the method of elevating and depressing the paddle wheels by means of a platform operated by adjustable screws and blocks, substantially in the manner and for the purposes above set forth.

64,393.—CHURN.—George L. Witsil, assignor to Eliza Libbet and John Crompton.

I claim, First The dasher handle, E, when constructed with a spiral spring entirely through the same in combination with the pin, B, for giving an alternately rotary motion to the dasher, with the vertical reciprocating action of the handle substantially as described.

Second, The combination of the concavo-convex dasher, C, with triangular openings and radial flanges, D, having angular notches in their ends, with a device for giving a reciprocating vertical and alternating rotary motion to the dasher, substantially as and ,or the purpose set forth.

Third, The combination of the dasher handle, E, constructed as described, and the crosspiece, G, when arranged to operate substantially as set forth.

64,394.—AUTOMATIC GATE.—Sylvester J. Wright, Ellsworth, N. Y.

I claim, First, The combination of the rollers, C, flexible straps, D and I, spring or springs, J, lever arm, E, and rope or chain, F, with each other, with the stationary box or frame, A, movable frame or platform, B, and gate, H, substantially as herein shown and described and for the purposes set forth.

Second, The combination of the coiled wire spring, L, or equivalent, with the gate, H, substantially as and for the purpose herein set forth.

64,395.—WATER WHEEL.—Thomas G. Hall (assignor to himself, Lewis Strayer, and Peter S. Boose), York, Pa.

First, I claim the vertical projection, g, on the buckets, K, substantially as described.

Second, The combination of the bent plates, F, forming converging inlets with the wheel having the parts, E G O, constructed as described, and with gates, I, having projections, i, all arranged substantially as herein represented and described.

64,396.—MACHINE FOR CUTTING FILES.—Elisha O. Potter (assignor to C. A. Warland and J. M. Ryder), Pawtucket, R. I.

First, I claim combining the chisel holder or device which holds the chisel with the chisel slide or other device by which the chisel is raised and lowered to and from the file blank by means of a circular bearing or socket, the center or axis of which is at or near the center of the edge of the chisel and the plane of its oscillation is transverse to the file, substantially as described.

Second, The manner in which I have combined or arranged the former or shaper which controls the inclination of the chisel to the bed, with reference to the bed and to a cutter frame made to oscillate in a vertical plane parallel to the length of the file to vary said inclination, by attaching the former or shaper to the bed and below the cutter frame, and causing the cutter frame to rest directly upon it for support, substantially as described.

REISSUES.

2,577.—GRINDING MILL.—Edwin P. Baugh, Philadelphia, Pa. Patented March 7, 1865.

First, I claim constructing the shell, A, of a number of tapering cast iron sections, b, and an exterior cast iron casing, the said sections being adapted to the casing and held in place, substantially in the manner described.

Second, Constructing the burr of a number of tapering cast iron sections, b, held in place, substantially in the manner described.

Third, The ring, L, made separate and distinct from the shell but serving to support both the outer casing of the same and the sections, b, of the shell as set forth.

2,581.—BREECH-LOADING FIRE-ARMS.—Cornelius Callghan, Boston, Mass., assignee of Wm. R. Landfear. Patented Sept. 6, 1864, Antedated Aug. 19, 1863.

I claim in combination with a breech-loading arm, a mechanism by which simultaneously a cartridge is driven into the barrel the breech block and hammer is securely locked against the barrel and the piece is discharged, all by drawing the trigger, substantially as set forth.

Also the lever, o n, applied to the breech and in combination with the opening, d d, in the frame, B, substantially as and for the purpose specified.

2,582.—HARVESTER.—Cyrenus Wheeler, Jr. Poplar Ridge, N. Y., assignee by mesne assignments of A. C. Brownlich. Patented Jan. 4, 1859. (Div. A.)

First, I claim in a two wheel machine, a frame carrying the cutting apparatus arranged to vibrate about a center coincident with the center of rotation of a bevel wheel which is mounted on an axis parallel with, but independent of the main drive wheel axle.

Second, The combination in a two wheel machine of a vibrating frame carrying the crank shaft and pinion with a frame carrying the bevel wheel mounted on an axis independent of the main drive wheel axle in such manner that the axis of rotation of said bevel wheel and the axis of oscillation of the vibrating frame shall coincide.

Third, So connecting a vibrating frame carrying a crank shaft and pinion with the frame carrying the bevel wheel mounted on an axle independent of the main gear wheel as that the axis of oscillation of said vibrating frame shall coincide with the axis of rotation of the two supporting wheels, the main gear wheel and the bevel wheel, substantially as described.

2,583.—HARVESTER.—Cyrenus Wheeler, Jr., Poplar Ridge, N. Y., assignee by mesne assignments of A. C. Brownlick. Patented Jan 4, 1859. (Div. B.)

First, I claim a vibrating frame carrying the cutting apparatus arranged to vibrate around a center coincident with the axis of rotation of a bevel wheel which is mounted on an axis independent of the main drive wheel axle, in combination with a means for locking or setting said vibrating frame at any desired angle of inclination to the ground.

Second, In a two wheel machine, a gear block or frame for supporting the gearing, provided with a recess for the draft pole constructed in one piece, substantially as described.

2,584.—PACKING FOR STUFFING STEAM AND OTHER ENGINES.—Richard Burr, Philadelphia, Pa., and The Silver Lake Manufacturing Co., Newton, Mass., assignees by mesne assignments of Morris Batticher.. Patented Oct. 4. 1864,

I claim a packing for stuffing boxes expansion joints, etc., composed of dry [illegible] substances combined with fibrous material, substantially as set forth.

2,585.—HANDLE FOR TEA AND COFFEE POTS.—G. B. Halsted, New York City. Ratented June 6, 1865.

I claim a handle for metal tea and coffee pots constructed of two longitudinal parts swaged and struck up, in any desired form, out of tinned plate and connected together by solder or otherwise, substantially as herein set forth.

2,586.—BRIDGE.—David Hammond, Canton, Ohio. Patented July 3, 1866.

I claim, First, The arch, B, composed of two double T-irons, b b, combined and arranged with clamping and securing pieces and covering pieces, in the manner and for the purpose herein specified.

Second, The clamping piece, D, constructed and arranged as hereinbefore specified.

Third, The clamping piece, P, constructed and arranged as hereinbefore specified.

Fourth, The securing piece, J, constructed and arranged as hereinbefore specified.

2,587. — FABRIC FOR HATS, BONNETS, ETC. — Modena Hat Company, New York City, assignees by mesne assignments of Henry Loewenberg. Patented Feb. 28, 1865.

I claim the new compound fabric hereinbefore described, having substantially a foundation of interlaced threads and a surface composed of fibrous material stiffened by gelatinous matter and consolidated by pressure.

2,588.—DEVICE FOR STOPPING AND CHANGING MOTION.—George L. Lincoln & Co., Hartford, Conn., assignees by mesne assignments of Francis A. Pratt. Patented Sept. 4, 1860.

We claim the combination of the levers or clamps, e, disk or collar, j, substantially as and for the purpose described.

We claim the application of a sliding or wedge collar, e, or its mechanical equivalent, for the purpose of operating the said levers or clamps, e, substantially as described.

We claim the clamps, e, or their mechanical equivalents, in combination with the set screws, e', or their mechanical equivalents, with proper actuating device, substantially as and for the purpose described.

DESIGNS.

2,633 and 2,634.—FLOOR OIL CLOTH OR CARPET PATTERN.—Robert Hoskins, Brooklyn, N. Y., assignor to Edward C. Sampson, New York City. Antedated April 6, 1867. Two Cases.

2,635 to 2,640.—FLOOR OIL CLOTH OR CARPET PATTERN.—Charles T. Meyer, Bergen, N. J., assignor to Edward C. Sampson, New York City. Antedated April 3, 1867. Six Cases.

2,641.—KNIFE OR FORK HANDLE, ETC.—Egbert W. Sperry, Wolcottville. Conn.

2,642 and 2,643.—KNIFE, FORK OR SPOON HANDLE.—Egbert W. Sperry, Wolcottville, Conn. Two Cases.

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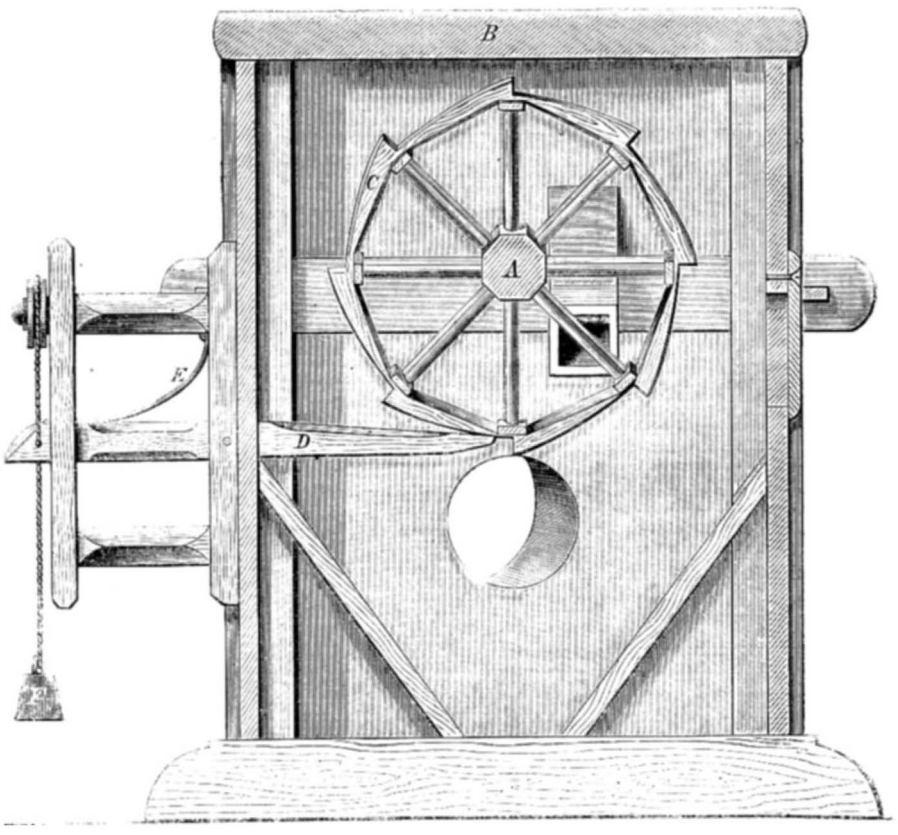
Improved Flour Bolt Knocker.

The object of the improvement shown in the engraving is to facilitate the bolting of flour by jarring the bolt cloths as the reels revolve, thus clearing the meshes and increasing the capacity of the bolts. It is particularly efficient when grinding soft or damp wheat which causes the meshes of the bolting cloth to become quickly clogged. The reels of the bolt are made in the usual manner, of spokes and connecting pieces, as at A, and the bolt case, B, is of the ordinary form and material. On the heads of the reel are secured wedge-like blocks, C, which form a series of ratchet teeth that as the reel revolves depress the pivoted bar, D, which is thrown back by the curved spring, E, and strikes the reel with a jar sufficient to vibrate the whole bolt cloth. The action of the spring is regulated by the cord and weight, F, which if lightened allows the spring to act with greater force and if added to decreases the action of the spring by raising the outer end depressing the inner end of the lever. This weight may be regulated by the miller so that it may produce the heaviest or the lightest stroke; the contrivance thus becomes a bolt governor.

Where the reel is very long, as over fourteen feet, two of these springs are better than one as they will work the whole cloth more surely. When there are two or more reels, one above another on the same side of the bolting case, and one revolves to the right and the other to the left, as they frequently do, the knocker blocks of one reel are reversed and a raised piece is put on the end of the lever where it comes in contact with the knocker block, sufficiently thick to clear the shoulder of the knocker. The engraving shows the lever applied to the underside of the reel, the usual way, but it may easily be adapted to the side or top.



SMITH'S FLOUR-BOLT KNOCKER.

It was patented through the Scientific American Patent Agency, Nov. 27, 1866, by A. R. Smith of Delaware, Ohio, who may be addressed for rights and machines.

A Raft Voyage to Europe.

The successful voyage across the Atlantic by the *Red, White and Blue*, and the yachts in the ocean race, has induced another adventurer to attempt the transit. The journey is to be undertaken on one of Perry's monitor rafts, now on exhibition in this city. This raft is constructed of three air-tight cylinders incased in heavy Russia duck cloth, each twenty-five feet in length by twelve and one half wide. When blown up these bags are connected by a light framework which also forms the deck. The raft is schooner-rigged with a lug sail forward, main sail aft, and jib. Cabin there is none, the only protection for the passengers being a small water-proof tent rigged amidships. Captain Mikes with two companions constitute the complement of men, and the expedition is to start about the middle of the present month, bound for Paris and the Exposition. The raft draws but seven inches of water, and with a fair wind the inventor states that her speed will be from twenty to thirty knots per hour.

As a surf boat the claims of this raft were well tested before the Commissioners of Life-saving Inventions, at Long Branch. Its buoyant capacity is estimated at 14,000 pounds, or it will float 585 people on deck and clinging to its sides. The raft is compact and can be stored, wrapped in a tarpaulin, in a space thirteen feet by twenty inches, and can be inflated, and launched ready for use in six minutes.

Cancer and Consumption.—Prof. Andrews, of the Chicago Medical College, has deduced some suggestive generalizations from examination of the census statistics of mortality, relative to these two dreaded, and as it seems in some way related, inheritances. They appear to coincide remarkably in their favorite haunts; following very nearly alike the two conditions of latitude and proximity to the seaboard, especially the Atlantic. New Mexico has least, of both diseases. Vermont takes the lead in cancer (1 in 40 deaths) and in consumption is second only to New Hampshire and Maine, which are respectively second and third in the former disease. The New England States stand foremost in both classes, followed closely by the middle states and Ohio. The western states come next in consumption, quite regularly. As nearly all these states are to a great extent colonies from New England, and the diseases are both hereditary, the true coincidence is perhaps rather congenital than climatic. The cold eastern seaboard, which so obviously generates consumption, is probably the parent also of the more mysterious cancer. Dr. T. W. Cooke, of London, remarks, in his work upon cancer, that a certain class of tumors which are liable to become cancerous usually occur in persons predisposed to consumption, and that by diligent inquiry he has found that most cancerous patients, not hereditarily such, are of more or less consumptive families, and are liable to transmit consumption to their offspring.

French Public Railways.—There are 9,072 miles of railroad in operation throughout the Empire, and 4,090 miles more are in course of construction. A grant of $290,000,000, has lately been made to these roads by the French Government on condition that at the end of ninety-nine years the roadways and tracks shall become national property. The provision does not call for the surrender of the rolling stock or other personal property.

Patent Claims.—Persons desiring the claim of any invention, patented within thirty years, can obtain a copy by addressing a note to this office, giving name of patentee and date of patent, when known, and inclosing $1 as a fee for copying. We can also furnish a sketch of any patented machine to accompany the claim, at a reasonable additional cost. Address MUNN & CO. Patent Solicitors, No. 37 Park Row, New York.

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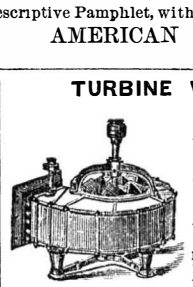

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